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COMPRISING EIGHT VOLUMES ON THE
YEAR'S PROGRESS IN MEDICINE AND SURGERY

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SERIES 1921

CHICAGO
THE YEAR BOOK PUBLISHERS
304 South Dearborn Street

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PEDIATRICS

PROGRESS IN PEDIATRICS

Plan for a Graduate Course in Pediatrics for General Practitioners. A Department of Pediatrics offering instruction to graduates, says J. L. Morse,[1] should be prepared to give courses of five different types in order to meet the needs of various classes of students. These courses should be planned for general practitioners who wish to improve their general knowledge of pediatrics and to become acquainted with the recent advances in the subject; for general practitioners or recent graduates who wish to become specialists in pediatrics, but not teachers or investigators; for those who wish to become teachers and investigators as well as specialists in pediatrics; for general practitioners living in the vicinity who wish to familiarize themselves with pediatrics; for specialists in pediatrics who wish to undertake special investigations.

Only the first type of course is considered here. It should be continuous throughout the year and so arranged that physicians may enter or leave it at any time. Necessarily, the work must be largely clinical, given partly in the wards in the hospitals and partly in out-patient departments. Special attention should be paid to the newer developments in pediatrics. It is important to have a systematic course of lectures given as a part of the work. Chief stress should be laid on details, the newer developments in pediatrics, and new methods of treatment. Provision should be made for instruction in ordinary clinical laboratory methods, covering examinations of blood, urine, stools and cerebrospinal fluid. The physicians taking this course should also be given an opportunity to see the working of a good social service department and of infant welfare clinics or milk stations. They should also be told what to read. A schedule illus-

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(1) Jour. Amer. Med. Ass'n., Aug. 7, 1920.

trative of a month's work as given at the Harvard Medical School is incorporated in this article.

Psychology of the Sick Child. A. Levinson[2] states that the sick child differs from the well child not only physically but also psychologically. In order to understand the sick child one must know the healthy child. Infants are normally active. Children are imaginative; they have a sense of justice and are happy by nature. When a child falls ill, no matter how slightly ill he may be, all normal psychologic characteristics either disappear or are perverted. He ceases to play, loses cognizance of his surroundings; attempts to please often bore or even anger the sick child. The power of imagination is stronger than usual and is directed along morbid channels in time of illness. Imagination becomes hallucination, and justice is turned into injustice. The sick child can not be happy. A knowledge of the child's attitude can and should be utilized by the physician, nurse and social worker.

Physical Defects in Children. Report of 602 Cases. The evidence presented by W. R. P. Emerson[3] points to the following general statements: Children reported to be sufficiently well to attend school, and to engage in the ordinary activities of normal children, were found to average 5.2 physical defects of all kinds and 2.5 nasopharyngeal defects. Children brought to a hospital clinic for examination and treatment showed an average of 6.8 defects of all kinds and 3.5 nasopharyngeal defects.

The distribution of number of defects according to age was remarkably uniform. In each group studied the largest number of children were between the ages of 7 and 9. These years showed the greatest average number of defects in the Massachusetts General Hospital group (7.2); but in the Little Wanderers' Home group the highest average number of (6.0) was found in the years from 10 to 12. There is no evidence of any particular age at which children have an especially large number of defects.

Only nine children of the 602 examined were found to be free from defects.

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(2) Mod. Medicine, September, 1920.
(3) Amer. Jour. Dis. Child., March, 1921.

The nasopharyngeal affections appeared in a large number of cases (Little Wanderers' Home, 49 per cent. of all defects found, Massachusetts General Hospital 53 per cent. of all). The most striking differences in percentages found in the comparison with results secured in public schools in New York and Philadelphia are in hearing nasopharyngeal obstruction, malnutrition and posture.

The correlation between the actual number of carious teeth found and underweight was negative in three out of four of the six groups.

The summary of relative incidence indicates that postural defects, especially round shoulders, have greater value for diagnostic purposes in malnutrition than is usually assigned them.

The mental tests made in the Little Wanderers' Home group showed positive correlation between mental retardation and the total number of all physical defects, nasopharyngeal, and teeth.

The Use of Water in the Diseases of Childhood. In cases of summer diarrhea, it is surprising, Talbot[4] states, to measure the total amount of water lost in the feces when six or more liquid stools are passed in the day. They may contain as much as one quart, the greater part of which is liquid. If the diarrhea is complicated by vomiting, it is easy to see why the body becomes so rapidly dried out and the patient appears so critically ill. The most important factor in treating such a case is to introduce sufficient liquid into the body to bring the body fluids up to their normal dilution. Parents often say that the child refuses to take water, but Talbot has never seen a case in which a child could not be induced to take the required amount of water in one way or another. He recalls one such case in which a trained nurse, on the third day of an infectious diarrhea, was able to administer 91 ounces to a child by persistence and ingenuity. The clinical results were startling, and the child changed in twenty-four hours from one whose recovery was doubtful to one whose recovery was certain. Although this is an extreme instance it is characteristic. In estimating how

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(4) Northwest Medicine, October, 1920.

much liquid should be introduced into the body, the amount that is normally taken during health should be taken as a standard; to this should be added about 50 per cent. more to compensate for what will be lost in the stools.

Fever also causes an increased loss of liquid from the body. This loss, however, is more difficult to estimate because it is usually lost through the lungs. If with the fever there is also restlessness, the loss of water may be very great. If there is also diarrhea, the loss will be excessive, and it will be found that twice the normal fluid intake will not be any too much to prevent the appearance of alarming symptoms.

In pneumonia the situation seems to be somewhat different because the distribution of water in the body apparently is abnormal. Although water may be retained in the body, it is bound to tissues which do not normally require it, and unless extra water is given there will not be enough circulating liquid to maintain the normal equilibrium of the body. An argument for this is the fact that following the crisis, in a case of pneumonia, there is remarkable increase in the water elimination *via* the kidneys and skin.

In intestinal intoxication in infants, associated with acidosis, there is impaired elimination of liquid from the kidney. This may be ascribed either to the loss of water in the stools in such great amounts that it is impossible for the infant to ingest sufficient fluid to replace that loss, or to the fact that the patient refuses to ingest liquid or vomits practically all that is taken. As a result the tissues become dehydrated. This may be cured by introducing enough water into the body.

The best treatment is, of course, prevention of desiccation of the body. The methods of introducing water into the body depend on the symptoms of the case under consideration. Even when there is no vomiting, and during the early stages of febrile diseases, a record of the amount of liquid ingested should always be recorded and added up at the end of each twenty-four hours. In this way only is it possible to know how much fluid the child is receiving. If this is taken into consideration early enough and the child is given the amount of liquid which would normally be ingested during health plus the estimated amount lost as a result of the disease, fewer untoward symptoms will appear. A study of the records of the liquid ingested is often highly interesting and the information thus obtained is very important. Sometimes it is necessary to force water when the child is not receiving enough. This should be done when necessary in all instances except when it is done at the expense of the child's strength or when it causes vomiting.

The second method of introducing water is by the rectum. Success with this method depends very much upon the means employed. Very little success can be expected during diarrhea when there is excessive peristalsis, but it should always be tried. In other conditions without diarrhea, water may be introduced once in four hours very slowly, taking half an hour to introduce three to eight ounces, according to the age of the child; or it may be administered by the Murphy drip, four to five drops a minute, for periods of three hours. This should be alternated with rest periods of three hours in order that the rectum will not become irritated and peristalsis started up.

Finally water may be introduced subcutaneously or intravenously. In most instances subcutaneous injection of water is sufficient, but occasionally when very rapid results are essential it is necessary to introduce it intravenously or intraperitoneally. The water should be absolutely sterile and should be isotonic with the blood—that is, a normal saline solution. From 3 to 16 ounces may be introduced at one time into desiccated children. It is surprising to see how quickly they react to this form of medication. When there is any desiccation of the body the results are practically always quick, and like those of a very strong stimulant.

[The Editor is in full accord with this valuable paper. We should not lose sight of the fact, however, that the questions of water metabolism, absorption, and retention, particularly in disease, are not clearly understood. One might ask: If a considerable quantity of water is introduced into the circulation what would be the immediate effects on the cardiac circulatory dynamics? Would the weakened heart and the great vessels adjust themselves to the suddenly altered conditions of pressure?—Ed.]

Intraperitoneal Infusion in the Dehydrated Infant. M. Weinberg[5] has employed this method seventy times in twenty-four children. He concludes that it is an easy and safe procedure when correct technique is employed and strictest asepsis observed. Intraperitoneal infusion makes possible rapid supply of large quantities of fluid. It may be repeated twice daily, without injury to intestine or peritoneum. No shock reaction was observed. Resorption of the fluid takes place during the first few hours up to 60 per cent. After twenty-four hours quantities up to 300 c.c. are absorbed. This method may be employed at any age, even in the newborn. Ringer's solution, physiologic salt, glucose and kalorose solution are used. Coloring matter and medicines may be added. Effects can be observed during, immediately or within the first six hours after infusion. Effect is noticed by the influence on pulse, respiration, weight, and general condition. In some cases there may be lightning-like improvement. The certainty of success with this method depends on the repetitions of the infusions. The sooner treatment is instituted the more rapid are the results. Temporary improvement should not lead to a cessation of infusions. Diseases on an alimentary basis are more easily influenced by this treatment than those of an infectious nature. The most important group of diseases to be thus treated are the intoxications. In many cases of chronic dehydration, especially those with a poor prognosis, intraperitoneal infusion is superior to other methods. This includes especially cases of decomposition. The main task of intraperitoneal injections is to tide the organism over a critical condition and to allow time for the therapeutic measures to act. This procedure is superior to subcutaneous infusion, both in regard to the technique and to the effect on the disease.

Over-Medication in Infancy and Childhood. In his address of the section on pediatrics of the Southern Medical Association, James D. Love[6] condemns both

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(5) Zeitschr. f. Kinderheilk, 1921, vol. 29, Nos. 1-2.
(6) Southern Med. Jour., January, 1921.

the therapeutic nihilist and the physician who habitually over-medicates his patients. He believes that infants and young children are more frequently subjected to over-medication than adults. The injudicious use of quinine and calomel; of opium for diarrhea; intestinal antiseptics for typhoid fever; and digitalis for heart disease and the promiscuous use of vaccines are condemned.

[A paper emphasizing the subject should be read in every county and district medical society in this land.—Ed.]

Effect of High Altitude on the Sick Child. E. Feer[7] has made numerous observations in the lower as well as in the higher altitudes. The most important indication for such treatment is the generally weak constitution. The increased heart and lung action produced by change in altitude has a strengthening effect on heart, lungs, and musculature of the thorax and its formation. The active exercise strengthens the flabby musculature. The active circulation of the skin increases the resistance. The stimulus to metabolism aids appetite and blood formation. Convalescents from severe infectious diseases belong in this group and are similarly benefited by high altitude. Bronchial gland tuberculosis is one of the most important and frequent indications. Scrofula and lung tuberculosis are also greatly benefited by this treatment.

Rickets is favorably influenced, since bone-marrow function is stimulated by high altitude.

Anemia, exudative diathesis, eczema, asthmatic bronchitis, chronic nasal and bronchial catarrh and neurasthenia also improve markedly, he says, in high altitudes. The question must be raised whether the factor of change of environment may be responsible for a part of the good results. This includes separation from a nervous mother, an irritable governess, discontinuance of school, new mental impressions, the quiet, the stimulating air, absence of dust and heat, exercise in fields, woods and mountains.

The high altitudes are especially recommended by Feer for tuberculosis, asthma and hay fever and for winter cures.

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(7) Schweiz. med. Wochenschr., May 12, 1921.

The general belief of foreign physicians that intermediary stations are to be made by the children before they attempt the high altitude is not shared by Swiss physicians. Severe acute diseases, decompensated heart lesions and grave anemias are contraindications. Children acclimate themselves more quickly than adults.

Therapeutically it is most difficult to decide how long rests should be instituted and when and to what extent exercise may be permitted. Carefully directed heliotherapy is beneficial. For the length of sojourn at the high altitude generally from six to twelve weeks are sufficient, except in tuberculosis and asthma. A rational diet is of importance.

Benzyl Benzoate in Pediatric Practice. John Ruhrah[8] comes to the conclusion that benzyl benzoate is a valuable addition to the therapeutic resources of the pediatrician. It may be used in place of atropine wherever a relaxing effect is desired on spasm of smooth muscle. The author has used it sufficiently to be able to recommend it in bronchial asthma, spasmodic bronchitis, gastric or intestinal colic, hiccough and spasmodic constipation. It has been recommended by others in excessive peristalsis. In whooping-cough its action is often most beneficial, but the results are uncertain, as is the case with all other antispasmodics in this disease. In general convulsive conditions not dependent on organic lesions of the central nervous system, especially in the new-born infant, the drug will be found of benefit. It is non-toxic but not particularly agreeable to take.

[This drug seems to present possibilities. It should be subjected to extensive clinical use and the results should be reported.—Ed.]

Acute Rheumatic Fever and Its Variants in Childhood and Adolescence. D. Riesman[9] does not believe in the etiologic significance of the organisms hitherto found. In childhood the disease presents certain important peculiarities. Though occurring in children of all ages—even intra-uterine infection has been described—it is found most frequently between the ages of 5 and 15 years, and is especially common about the period of

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(8) Amer. Jour. Med. Sci., January, 1921.
(9) Jour. Amer. Med. Ass'n., May 21, 1921.

puberty. It seems to affect girls a little more frequently than boys. The joint involvement is often slight. The so-called growing pains are frequently rheumatic signals. Involvement of the heart is very common in children. Neither its occurrence nor its intensity bears any definite relation to the severity of the joint involvement. Follicular tonsillitis is a frequent pre-occurrence in the acute attack, and is a common antecedent in the patient's history. Chorea is a sequel in a number of cases. Skin manifestations are more common in children than in adults. Cerebral rheumatism, characterized by delirium and hyperpyrexia, is rarely seen in childhood; it is a complication of the disease in adults.

Cardiac involvement may occur within twenty-four hours after the beginning of the disease. Aortic involvement, while not so common as mitral, is much more frequent than is indicated in text-books.

Mitral endocarditis may be followed by complete recovery; at any rate, all auditory evidence may disappear. It is, however, possible that mitral stenosis is a delayed result of a mild and apparently evanescent lesion. It is this tendency on the part of the systolic murmur to disappear that has led some observers to doubt its inflammatory origin.

Aortic lesions, probably on account of the greater strain on the delicate valve leaflets, very rarely disappear. Double valve involvement rarely occurs in the first attack. It usually means at least two separate seizures. Pericarditis is extremely common, and may occur after one of the valves has been attacked or without such prior involvement. It is usually entirely painless. It does not always produce a to-and-fro friction sound at the beginning, but rather a rumble resembling a valvular murmur. The true nature of the sound may, however, be recognized by its superficial character and by its location away from a valve point toward the base of the heart, over the upper sternum. Pericarditis nearly always causes fever and frequently an increase in the respiration rate.

A feature in pericarditis that may cause error in diagnosis, is the presence in many cases of the signs of pneumonic consolidation of the left lung. The deceptive signs are probably produced through compression of the left lung by the heart. The myocardium probably never escapes entirely in acute rheumatic fever. The most characteristic of rheumatic skin affections is the rheumatic nodule, which histologically resembles the miliary nodule in the heart muscle. These nodules occur in cases with marked cardiac involvement.

The treatment consists of salicylates from 6 to 10 gm. a day (90 to 150 grains) and should be given in divided doses for the first twenty-four hours, so as to get as much salicylate as possible into the body. Local measures are of value. Water should be given in abundance, either plain or as lemonade or orangeade. The food should be that of all febrile diseases.

Until the cause of rheumatic fever has been definitely isolated, the use of vaccines and serums is empiric. In rare instances the use of a stock vaccine in an obstinate case seems to prove beneficial.

The patient who has had rheumatic fever should protect himself in every way against wetting and chills. Tonsillectomy is justified, if the tonsils are diseased.

Absorption of Fluid Injected into the Peritoneal Cavity. B. S. Denzer and A. F. Anderson[1] studied the results of fifty abdominal taps made by them by means of their trocar-cannula and glass capillary tubing. In thirty-four cases no fluid was obtained. The authors conclude that in the normal peritoneal cavity no fluid can be demonstrated by their method. The sixteen cases which showed fluid comprised three cases of generalized tuberculosis, one of ascites with congenital syphilis, three of peritonitis, four of marasmus and five of rickets with pot-belly. In studying the absorption of fluid injected into the peritoneal cavity, it was found that it occurs in from twelve to forty-eight hours. Intraperitoneal injection of saline solution caused a temporary reaction—a sterile inflammation. This is a safe method for the diagnosis of very small quantities of peritoneal fluid—as low as 5 c.c. of fluid injected were recovered, and of following the course of an inflammatory reaction in the peritoneal cavity.

Growth in Length of Normal Infants and Infants with Nutritional Disturbances. Observations of the

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(1) Amer. Jour. Dis. Child., June, 1921.

growth in length of healthy breast-fed infants showed that this curve lies between the curves of Heubner and Camerer. B. Waser[2] observed frequently an apparent decrease of the length of the body in the first few days of life due to deformities of the head and tumors of the head; apparent inhibition of growth at the time of the child's learning to stand and to walk because of changes in the curvature of the spine, compression of the intervertebral discs and joints; and in the following months increased growth because of the stimulus of active movements. The author represents absolute and relative growth in length in graphic curves. He calculates the index ponderalis; it amounts to 2.8-3.0 in the breast-fed, and to 2.6-2.7 in the child with nutritional disturbances. The author also investigated the growth in length of infants with nutritional disturbances and those suffering with pyloric stenosis. He observed increase of the body length during the period of reparation of dyspepsia of light degree. There was marked inhibition of growth after decompositions, growth after recovery. Stationary growth in length was noticed in therapeutic inanition, with beginning of growth after food increase. Growth in length was noticed even in stationary weight or in decrease of weight, especially in very young children. In pyloric stenosis stationary growth of length and weight was observed; there was immediate growth in length and weight after the inanition caused by the stenosis was relieved. The relative growth showed the greatest increase during the period of reparation.

A New Method of Diagnosis of Peritonitis in Infancy and Childhood. A preliminary report of a method of obtaining peritoneal fluid is given by B. Denzer.[3] He uses capillary glass needles which he inserts through an opening made by a number 17-gauge steel needle in the midline about one half inch below the umbilicus. The glass needle is firmly pushed inward until the sudden release of pressure indicates that the needle has entered the peritoneal cavity. In order to add siphonage to the force of capillary attraction and obtain a large amount of fluid, a bulb was blown and the tube was bent. In a small series of normal children fluid was

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(2) Zeitschr. f. Kinderhlk., 1920, vol. 27, Nos. 1-2.
(3) Amer. Jour. Dis. Child., August, 1920.

obtained in only one case. In two cases of ascites, before a clinical diagnosis of excessive fluid could be established, puncture demonstrated the presence of fluid. In the one case of peritonitis in which the author had the opportunity of trying this procedure, purulent fluid was obtained. The advantages of glass needles are that the capillary attraction of glass is greater than that of metals and that the smallest amount of fluid rising in the tube can readily be seen. The disadvantage is fragility. The author is experimenting with needles and trocars of metal and glass in the hope of combining the advantages of both materials.

DISEASES OF THE NEW-BORN

Changes in the Form and Dimensions of the Chest at Birth and in the Neonatal Period. R. E. Scammon and W. H. Rucker[4] studied the changes in the form of the thorax in the new-born by measuring the thoraces of late fetuses and full-term still-born children, and of living infants on the first, third, fifth, seventh, tenth and twelfth day after birth and by a number of observations on the horizontal chest circumference immediately before and after the first inspiration. The thoracic index is a value determined by dividing the antero-posterior diameter of the chest by the transverse diameter and multiplying the quotient by 100.

The modifications in dimensions and form which the thorax undergoes at birth and in the neonatal period may be summarized as follows:

Age	Average of Indices		
	Number of Cases	At the Level of the Nipples	At the Level of the Tenth Rib
9th fetal month	18	86.5	92
10th fetal month	13	86.0	92
Birth (full-term fetuses)	19	86.0	91
15 minutes after birth	23	106.0	95
1st day (12 hrs.) after birth	23	102.0	92
3rd day after birth	23	102.0	89
5th day after birth	21	100.5	91
7th day after birth	18	102.0	91
10th and 12th days after birth	10	100.5	88

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(4) Amer. Jour. Dis. Child., June, 1921.

The horizontal chest circumference (at the nipples) is markedly increased at the first inspiration. In the first day, within twelve hours after birth, it enters a period of decrease which continues for two or three days and which is followed by a period of circumference increase. The initial circumference following the first inspiration is regained in the second week. No data are available as to the changes in the circumference of the chest at the tenth rib with the establishment of respiration, although it is probable that they are somewhat similar to those at the nipples, although less extensive. After respiration is established, the circumference at the tenth rib undergoes, first a decrease, and then an increase in a manner similar to that of the circumference at the level of the nipples.

The anteroposterior and the transverse diameters of the thorax, both at the level of the nipples and at the level of the tenth rib, show changes comparable with those of the circumferences at these levels. They decline in magnitude from the first to the fifth day after birth, and then enter a period of recovery, the initial dimensions (after respiration is established) being regained about the middle of the second postnatal week. The anteroposterior diameters undergo a much greater reduction than the transverse diameters.

The thoracic index at the nipples stands at about 86 before birth. With the establishment of respiration it rises to an average of 106 and then drops to about 102 in the first twenty-four hours. During the remainder of the neonatal period, it declines irregularly and slowly, being 100.5 in the middle of the second week. The changes in the thoracic index at the level of the tenth rib are of the same general character as those at the level of the nipples but are less pronounced. The changes in the form and dimensions of the chest in the neonatal period (with the exception of the postnatal loss in circumference and diameter which seem to be associated with postnatal weight loss) are reflected in the order and degree of expansion of the different parts of the lungs.

The Nature and Management of Neonatal Diseases. J. W. Ballantyne(5) attempts to show that the neonatal maladies are not so decisively special in their nature as has often been thought; and suggests that the specificity of their characters is in many cases to be explained by the age at which the diseases develop and by the peculiarities of the anatomy and the physiology of the neonatal state and the environment then existing. Neonatal diseases are not special, but their manifestations have a special character by reason of the marked type of the life which they render morbid. They have often also been termed idiopathic; but the true explanation of their etiology probably is that the causes which produce them are those which produce disease at other times in life altered in their impact by the circumstances of the neonatal life. In other words, the striking differences shown by neonatal diseases and the apparent inexplicability of their causation are both the result of the new-born infant's unique personality, recent experiences, and present environment. Almost every part of the infant's anatomy is on the way from one thing or state to another. The atelectatic lungs of antenatal life are expanding in the neonate into the fully-distended, air-containing organs of the child, and in association with this transformation, structural alterations are going on in such vessels as the ductus arteriosus, the ductus venosus, and the umbilical arteries and veins. The three-chambered heart of the fetus is changing into the four-chambered one of the child, and smaller modifications are taking place in the anatomy of the liver, the stomach, the intestines, and the kidneys. Some parts of the body, as, for example, the cranium, retain fetal characters more persistently than others. The unclosed sutures and the open fontanelles of the head of the new-born modify cerebral diseases such as hydrocephalus and hemorrhages very markedly. These anatomic differences should never be lost sight of when the physician is studying the diseases of neonatal life. The large size of the liver and the thymus are significant. These anatomic considerations have a still greater importance when the new-born infant is also a prematurely born one. The physiology of neonatal life is also a transitional one; it is fetal physiology in process of alternation, readjustment, and modification in order that it may become infantile physiology. Every one knows that histologically fetal blood is very different from adult and infantile blood; but no one yet has discovered the ways in which its biochemistry differs.

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(5) Archiv. Pediat., March, 1921.

When the prematurely born infant is looked at, physiologic considerations become still more clamant, for the premature infant is unable at once to replace the physiology of fetal existence with that of postnatal life. Hence many of the neonatal maladies and the appalling numbers of neonatal deaths.

A scrutiny of the anatomic and physiologic peculiarities of the new-born infant prepares the investigator for the discovery of manifest peculiarities in neonatal pathology. The new-born infant has, as a fetus, been liable to diseases and he may bring them with him into postnatal life, if they allow him a chance of surviving birth, which is rare; after birth he is much more at the mercy of the germs of disease, and their avenue of access to him is extended from one portal (the umbilicus) to several (mouth, nose, throat, skin, etc.). These facts have a marked bearing upon pathology. It is possible to recognize special characters in some neonatal maladies as due to the antenatal avenue of access for germs (the umbilical) which persists for a short time in the mature new-born infant and for a longer time in the premature one. Microörganisms of various kinds, including those of sepsis and tetanus, may find their way into the body of the neonate through the umbilicus; producing the fatal variety of jaundice of the new-born, depending on septic hepatitis, or erysipelas neonatorum, affecting the sub-umbilical region and the scrotum. When the falling off of the cord is associated with persistent patency of the umbilical vessels, as in the premature infant, such an umbilical invasion is specially liable to occur. Recurrent jaundice in successive children of the same parents is sometimes ascribed to more or less mysterious hereditary influences, but it is not infrequently simply the manifestation of septic hepatitis due to persistent lack of aseptic precautions in the treatment of the umbilical cord. Tetanus neonatorum is now known to be simply tetanus of the ordinary sort due, however, to the arrival of the tetanus bacillus in the body of the new-born by the typical antenatal avenue, the umbilicus. If the umbilicus be kept germ-free, tetanus neonatorum disappears.

Some of the diseases of the neonate are due to microbe infection before the life after birth has begun. An instance of this is found in ophthalmia neonatorum. The author has little doubt that it will be discovered that many other microbic maladies owe their origin to intranatal infection. The fact that deaths occur in infants of 24 or 36 hours, in which the necropsy reveals advanced pneumonia with swarms of streptococci in the lungs, suggests infection of the lungs before birth. When it is discovered, as is often the case, that in these births there has been early rupture of the fetal membranes rendering the access of germs to the nose and throat of the unborn infant an easy thing, it is not difficult to accept the theory of intranatal invasion of the child's lungs. The conclusion is arrived at that aseptic midwifery, from the standpoint of the prevention of neonatal maladies, gains an increased importance, and that early rupture of the membranes is of ill omen. The protected and semiparasitic life before birth permits such maladies to reach extraordinary degrees of severity, and thus it comes about that neonates may suffer from such diseases as ichthyosis and dropsy and ascites in grossly exaggerated forms. The author suggests as a possibility that syphilis may show itself in other than the ordinary ways, *e. g.*, in the extraordinary tendency that exists to the occurrence of hemorrhages in the internal organs, such as the brain, the spinal cord, the suprarenal capsules, and liver. Neonatal syphilis, when it does occur, is well known to have characters which are special to it; but it may well be that the full measure of their specificity has not yet been realized.

Neonatal diseases are ordinary, not extraordinary, diseases, but they occur in an organism which is extraordinary in the sense that it is a transition one and so they come to have peculiar characters and a special mortality. The new-born infant is the meeting place of antenatal morbid tendencies with postnatal pathologic causes and lesions, and these diverse influences all fall upon a body which has just passed through the unique experience of birth.

There are four directions in which progress in the management of neonatal diseases is possible and desirable. There is abundant room for research. Research laboratories are badly needed in connection with every maternity hospital. In the second place, far more attention must be given to the teaching of neonatal disease and health. Each course of teaching on obstetrics ought to be reinforced by instruction on neonatal maladies and their treatment; and the examining bodies ought to demand certificates of such studies. In the third place, the hospitalization of the new-born infant is in many places a real necessity. Every maternity hospital should have its neonatal department for the care and treatment of the delicate, the premature, and the diseased neonate. In the fourth place, there is need for specialization in neonatal medicine, and this applies to doctors and to nurses as well as to the teaching of the subject and the construction of hospitals. Great advances have been made in recent years in reducing infantile mortality between the ages of 1 and 12 months; but what may be called the neonatal bloc remains largely untouched, the number of deaths per 1,000 live births in the first month of life being as high as ever.

[This very valuable discussion deserves the closest attention of every one interested in the diseases of the new-born. The mortality rate during the first weeks of life is too high. We desire to emphasize what Ballantyne states that continued and careful study should be directed to the pathology of this period of life.—Ed.]

The Capacity of the Stomach in the First Ten Days of Post-Natal Life. It has been found by R. E. Scammon and L. O. Doyle(6) that the average physiologic capacity of the stomach in the first day after birth is about 7 gm. This practically doubles in the second day, quadruples on the third, and increases almost sevenfold on the fourth. After the fourth day, the increase is much slower and the average capacity on the tenth day is 81 gm. or over eleven times that of the first day. The average maximum physiologic capacity increases in much the same manner as the average physiologic capacity. It is about one-fourth greater than the average physiologic capacity on the first day and about two-thirds greater on the second. Thereafter the difference between the two measures decreases rapidly until the sixth day. After the sixth day the average maximum capacity remains about one-third more than the average capacity.

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(6) Amer. Jour. Dis. Child., December, 1920.

The relative physiologic capacity increases in much the same way as the absolute physiologic capacity. It is equal to 0.21 per cent of the birth weight of the body on the first day, to 1.38 per cent on the fourth day, and 2.43 per cent on the tenth day. The relative maximum capacity is equal to 0.27 per cent of the initial body weight on the first day, to 1.96 per cent on the fourth day, and to 3.17 per cent on the tenth day.

In the first ten days, parity has no constant effect on the physiologic capacities of children having an initial body weight of from 2,000 to 4,000 gm. Sex has no effect on the physiologic capacity in this period.

The average deviation in physiologic capacity rises rapidly from the first to the fourth day. Thereafter it increases very slowly. The percentage deviation decreases rapidly until the fifth day and thereafter continues to drop very slowly.

All indices of physiologic capacity indicate that there is a distinct change in the nature of this value about the fourth day. Until this time the increase in capacity, in whatever manner it is calculated, is very rapid, thereafter it is much slower. In the first four days average deviation in capacity is increasing rapidly and percentage deviation is decreasing rapidly. After this time both of these measures change very little.

The anatomic capacity of the stomach at birth averages 33 c.c. This is increased about one-third in the first three or four days and is a little more than doubled in the second week. There is no indication of two definite stages in the development of anatomic capacity in the neonatal period corresponding to the two phases of physiologic capacity. Anatomic capacity and physiologic capacity approximate one another about the fourth day. Thereafter, physiologic capacity runs parallel to the anatomic capacity but is slightly greater. This agrees with previous findings regarding this relation throughout the greater part of the suckling period.

The curve representing average physiologic capacity in the first ten days of postnatal life shows two phases. The first segment, extending from birth to the fourth day, shows little relation to the actual capacity of the organ but is rather a measure of the ability of the average mother to furnish nourishment in this period and the ability of the average child to receive it. The second segment, extending from the fourth to the tenth day, is probably a fair measure of the actual increase in gastric capacity comparable with similar measures of this value made at later times in the suckling period.

The gastric capacities of children weighing 4,000 gm. or over at birth are somewhat different from those of infants of lighter weights. Both the average and the average maximum physiologic capacities of this group are smaller than those of lighter children in the first three or four days of postnatal life, but these values increase rapidly in the fifth and sixth days and before the end of the period exceed those of smaller infants. Parity has a slight but distinct effect on physiologic capacity in this group of large infants, and first-born children have a smaller capacity than do the later born. The anatomic capacities of children of this group are somewhat greater absolutely but smaller relatively than in children of the lighter groups.

Presence of Sugar in the Urine of New-Born Infants. F. Milliken[8] was able to obtain the urine of a series of new-born infants for sugar determination. The urine was collected during the period preceding the first feeding. None of the births were difficult, so that the results can not be vitiated by the transitory traumatic glycosuria described by Hoeniger. The method employed for the determination was that described by Benedict and Osterberg. The first five cases showed 0.036, 0.034, 0.072, 0.05 and 0.136 per cent. sugar, respectively. The amounts of urine for each individual varied between 6 and 34 c.c. Amounts of total urinary sugar for the collection period ranged from 1,722 to 27,948 mg., with an average of 9,536 mg. Concentration of sugar varied be-

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(8) Amer. Jour. Dis. Child., May, 1921.

tween 0.027 and 0.166 per cent., with an average of 0.078 per cent. Unfermentable sugar was present in lower percentages than in the urine of infants and adults on regular diets, or in the urine of adults during the fasting period of the day.

Study of the Urine Sugar in Infants. One hundred and seventy urine sugar determinations on thirty-seven infants were made by R. M. Greenthal.[9] He states that urine of all normal infants contains a determinable amount of reducing sugar. The amount of sugar excreted is not dependent on the volume of urine but is directly proportional to the amount of sugar ingested. As the amount of sugar in the diet is increased, the total urine sugar increases. This increase is chiefly in the fermentable portion and as a result the percentage of nonfermentable sugar becomes less. Sugar excretion in infants, both fermentable and non-fermentable, is fairly constant when the intake of sugar is constant.

The Infant of Low Birth Weight, Its Growth and Development. H. Schwarz and J. L. Kohn[1] observed 272 children with low birth weights in 11,100 deliveries at a maternity clinic in New York. From their observations they conclude that from 2 to 5 per cent of all viable births result in children of low birth weight. The mortality rate during the first month in this type of case is ten times that of the normal. The lower the birth weight, the greater the mortality. The mortality rate for the year in cases of this type is four and one-half times the normal. In these children of low birth weight the mortality is twice as great in the premature as in the full term. Twinning in the premature does not markedly affect the mortality rate. In the full term, the single pregnancy has twice the chance for life as compared with the twin pregnancies.

The gain in weight during the first twelve months is at the same rate as that of the normal child, so that the deficiency is not made up at the end of the first year. Twins do not act differently from single pregnancies. The growth in length is not made up during the first twelve months. These children seem to attain the normal

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(9) Amer. Jour. Dis. Child., December, 1920.
(1) Amer. Jour. Dis. Child., March, 1921.

in length sooner than the normal in weight. It is only before the end of the fourth year that they compare with children of normal birth weight.

The general condition and mentality seem to be that of normal children through infancy and early childhood, although these children have a greater tendency to anemia and rickets.

Clinical Study of the Premature Infant. P. Cook[3] analyzes his statistics of seventy-seven premature infants. Of maternal complications during pregnancy, twenty-nine mothers were seriously ill, nine suffering from toxemias of pregnancy, five from syphilis, five from tuberculosis, six from nephritis, three from heart disease, one each from pneumonia, multiple arthritis and neurosis. Of these children sixteen lived, fifteen died. The actual cause of prematurity was not stated in thirty-three, bleeding (placenta previa or premature separation of the placenta) in fourteen, nephritis in five, toxemias of pregnancy in eight, syphilis in five, trauma in four, heart disease in two, tuberculosis in three, pneumonia in one, alcoholism in one and neurosis in one.

A majority of the infants were born after a gestation period of seven or eight months. The average birth weight of the series was 1,845 grams. Of those who lived the average birth weight was 1,986 grams. The smallest child to survive weighed 1,250 grams and was 38 cm. long. The average initial loss of the infants of this series was 220.6 grams. Sixty babies cared for in an old hospital building by means of clothes baskets and hot water bottles had a mortality of 46.6 per cent.; seventeen who had the benefit of an incubator room in a new hospital had a mortality of 29 per cent. Complications were noted in twenty-eight infants, of whom fifteen died. Hemorrhagic disease and congenital atelectasis were most frequent. Complications occurring later were mainly disturbances of nutrition and infections of the skin and upper respiratory tract. The method of feeding was individual; in general a three-hour schedule was employed and breast milk was available for all but five, nineteen receiving it exclusively. The remainder were given supplemental feedings of modified cow's milk.

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(3) Archiv. Pediat., April, 1921.

Those receiving no breast milk suffered a mortality of 60 per cent.; those fed entirely on breast milk, 31 per cent.; those on mixed feeding 12 per cent. The author confirms Abt's point that in mixed feedings it is necessary to have at least 50 per cent. breast milk. The optimum caloric requirement was found to be 160 calories per kilogram of body weight.

Of the thirty-three deaths, nineteen occurred on the first day.

Coagulation Time of Blood in the New-Born. Statistics from F. C. Rodda's clinic[4] show that postmortem examinations reveal cerebral hemorrhage in more than 50 per cent of all infants who die *intra partum* or during the first few days of life. These findings often were observed following non-instrumental or even easy deliveries. They were especially frequent following breech presentations and in premature births. At necropsy the blood was often found only slightly coagulated or even fluid. The most frequent cause of death in the new-born is cerebral hemorrhage. The author reports four cases of hemorrhage and states that there are factors other than instrumentation and trauma concerned in cerebral hemorrhage, and that perhaps the obstetrician is carrying some burdens unjustly laid upon him. He, therefore, undertook studies on the coagulation time of blood in patients giving evidence of cerebral hemorrhage. He found that the average coagulation time in the normal new-born infant is seven minutes, that there is a prolongation of coagulation and bleeding times from the first to the maximum on the fifth day of life, with a return to the average first day determination time before the tenth day. It is significant that this coincides with the age incidence of hemorrhagic disease and cerebral hemorrhage. Evidence of hemorrhages appeared when a prolonged bleeding time accompanied a delayed coagulation time. Delayed times were favorably affected by the subcutaneous administration of whole blood. In icterus neonatorum, normal coagulation and bleeding times were found. Several cases of melena neonatorum gave markedly prolonged coagulation times.

The author comes to the conclusion that severe

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(4) Jour. Amer. Med. Ass'n., Aug. 14, 1920.

trauma results in massive hemorrhages and early death. A more frequent cause of cerebral hemorrhage is mild trauma plus hemorrhagic disease of the new-born, accompanied by findings of delayed coagulation time and prolonged bleeding time. A delayed coagulation time and prolonged bleeding time can be controlled by the subcutaneous injection of whole blood. This is a rational therapy in cerebral hemorrhage. In severe cases, surgery should be employed early; operation should be controlled by blood studies and the injection of blood if indicated. The coagulation time and bleeding time should be determined in every new-born child presenting unusual symptoms or, better, as a matter of routine. If reactions are delayed, blood should be administered.

[We are accustomed to think of meningeal hemorrhages in the new-born as the result of trauma, and we frequently blame the obstetrician for the damage when he is not responsible. Dr. Rodda has established a normal coagulation time for the blood of the new-born infant and also worked out the normal bleeding time. Babies with meningeal hemorrhage bleed slightly at first, though later a continuous oozing occurs leading to the accumulation of a considerable quantity of blood. If we detect a tendency toward bleeding, or if we recognize the fact that oozing is going on by Dr. Rodda's method of determining the coagulation time, we will be able to control the hemorrhage.—Ed.]

Blood Transfusion in the New-Born. Bamberger[5] advocates blood transfusion in hemophilia, internal hemorrhages, and severe anemias of unknown etiology. Instead of the direct method, which requires great technical skill and special instruments, he advises the indirect method which acts in the same way, and which can be performed by any physician anywhere. Since for the new-born the donor is usually the mother or the father, tests for hemolysis are not necessary. For every 50 c.c. of blood 5 c.c. of a 2.5 per cent. sodium citrate solution are added. 5 c.c. are put in the measuring cylinder before the procedure and 5 c.c. after 50 c.c. of blood have been allowed to run in. The blood is infused into the exposed median vein. Care must be taken that the inci-

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(5) Ill. Med. Jour., January, 1921.

sion extends about 1 cm. above the elbow crease, and that the thickest lumen needle possible is used. For the infusion the author uses a graduated cylinder and begins with the blood transfusion only after easy flow has been observed with the use of normal salt. A detailed description of the instruments necessary is given in the original paper.

Surgical Treatment of Cerebral Hemorrhage in the New-Born. Attention is directed by Strachauer[6] to the importance of cerebral hemorrhage and its neglected treatment. It is the cause of death in over 50 per cent. of the infants, still-born or dying within the first week of life at the University of Minnesota Hospital. Its frequent occurrence without death is attested to by the thousands of cases of mental deficiency, spastic palsies, epilepsy, blindness, and varying degrees of amentia. The early recognition and the prompt institution of appropriate treatment will prevent many of these deaths and, much more important, avoid the sad sequels of cerebral hemorrhage.

The etiology of cerebral hemorrhage of the new-born is complex. Incident to the trauma of parturition, the molding of the head, the overlapping of the parietal bones, or the occipitals under the parietals, the blood-vessels of the brain may be torn. Excessive trauma may even cause laceration of the large veins and sinuses, with prompt death. Spontaneous rupture of the delicate vessels may occur in the cerebral congestion of asphyxia neonatorum. Cerebral hemorrhage occurs as frequently in normal, precipitate, and even premature births as after stormy labors. Cerebral blood-clots have been found before birth. Hence there are causative factors to be considered other than those of trauma. The majority of cases are caused by a combination of the normal trauma incident to childbirth and a phase of the so-called hemorrhagic diseases of the new-born. Rodda[7] in his work on the coagulation and bleeding times of blood in the new-born has shown that "there is a prolongation of coagulation and bleeding times from the first to a maximum on the fifth day of life, with a return to the average first-

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(6) Minnesota Med., December, 1920.
(7) Page 26, this volume.

day determination time before the tenth day. It is significant that this coincides with the age incidence of hemorrhagic disease and cerebral hemorrhage.'' This normal prolongation of the coagulation and bleeding times makes it difficult for nature to control the hemorrhage incident to the traumatic rupture of the delicate cortical vessels. The blood-clot in the vessels is soft and easily disturbed. When the coagulation and bleeding times are abnormally and greatly prolonged, as in the condition of hemorrhagic disease of the new-born, the oozing or bleeding continues, causing increased intracranial pressure, convulsions, and death. If the infant survives, the after-results of the increased intracranial pressure and cerebral degeneration may manifest themselves promptly, or slowly in the course of months.

The hemorrhage may be supratentorial, infratentorial, or intraventricular—the blood coming from the longitudinal sinus or its tributary system, the transverse sinus, or the vessels leading to it, or the chorioid plexus repectively. It may come from a torn tentorium. The hemorrhage is most commonly cerebral and unilateral, the blood coming from the delicate cortical vessels. The blood may clot or remain fluid. Among eighteen autopsies upon cases of cerebral hemorrhage at the University Hospital by Dr. Warwick, there was no instance of gross hemorrhage into the brain substance.

The history of the births, while important, shows in the majority of the cases normal and non-instrumental deliveries. The birth may even be precipitate. Various degrees of asphyxia neonatorum and delayed spontaneous respiration are common. The respiration when established is frequently slow, shallow and irregular. The pulse is slow in the moderate degree of compression, and rapid when medullary paralysis is imminent. Inequalities of the pupils and ocular palsies may be present. Hyperactivity of the reflexes, the child starting and twiching in response to mild or normal stimuli, with the development of spasticities, and focal or general convulsions, are characteristic. Examination of the fontanelle may disclose a distention, a tenseness at times of board-like degree, or actual bulging, with loss of pulsation. The sutures may be separated and the veins of the eyelids and forehead prominent and dilated. The infant may be languid, apathetic, and have difficulty in swallowing. Disinclination or inability to suckle is common. The delivery may be normal or stormy and a slow cerebral hemorrhage be present, not manifesting itself until after several days with the gradual development of cerebral compression. The symptoms may be mild, with perhaps a convulsion or two, and the child seemingly recover spontaneously. Later observation discloses the lack of mental development—the spasticities, deafness, and blindness; or epilepsy may develop from adhesions, scar, cysts and so forth, depending upon the location and extent of the hemorrhage.

The coagulation time of the blood and bleeding time will be found prolonged in the majority of the cases. This information is most important, and with Rodda's simple method should become a routine estimation in the new-born. When both times are greatly prolonged, hemorrhage can be anticipated and prophylactic injections of blood made or transfusion be performed. The hemorrhagic tendency should be controlled, and evidence of hemorrhage most assiduously watched for.

A spinal puncture should be performed, and spinal manometer readings be made. In the infratentorial hemorrhage, blood under various degrees of pressure may be obtained. In the supratentorial cases microscopic blood may be present in the spinal fluid, but the finding is not reliable. Xanthochromia should be tested for; when positive it points to hemorrhage about the base of the brain or upper cord region.

Prolonged coagulation and bleeding times call for the injection or transfusion of blood. Repetition is guided by the blood findings. In the slow bleeding cases this treatment may be preventive and sufficient. The shortening of the coagulation and bleeding time in severe hemorrhages is absolutely essential to successful surgical intervention.

In the infratentorial cases spinal puncture or punctures may be performed. As much as from 60 to 80 c.c. of blood may be removed at a time, the tenseness of the fontanelle subsides, and prompt relief of symptoms is obtained.

Craniotomy should be promptly performed in the cases of supratentorial hemorrhage. This may consist of a decompressive operation or an osteoplastic craniotomy with the removal of the blood. In view of the fact that the hemorrhage is on the surface of the brain and not into its substance, a simple decompressive craniotomy without disturbance of the clot may at times suffice, or in very grave cases be performed preliminary to a later operation for the removal of the blood.

The delicate brain tissue of the infant withstands the effect of pressure poorly. This is indicated by the many cases of Little's disease, the various degrees of amentia, and autopsy statistics, the compression anemia preventing normal medullation and development. The architecture of the infant's skull is planned to relieve a certain degree of increased intracranial pressure, being partially distensible by means of the broad sutures and the fontanelles, which latter may be termed nature's prophylactic decompression. This provision, however, suffices for only the mildest degrees of increased pressure beyond which operative decompression must be performed to prevent the degeneration of the brain or the impending medullary paralysis in the more severe hemorrhages.

[Considering the severity of these cases, particularly the after-effects on the nervous system, localization of the hemorrhage should be attempted and surgical treatment should be advised. If nothing else can be done, a decompression may be produced by operation, and possibly the severe results of pressure on the cerebral cortex and the destruction of cells, with subsequent degenerative processes, may be prevented.—Ed.]

Exomphalos, or Hernia Into the Umbilical Cord. Exomphalos is defined by R. Tennent[8] as a true hernia of abdominal contents into the umbilical cord. It has been estimated to occur in from one in two thousand births to one in six thousand births. Five cases of this condition are reported in this article in all of which the infants were operated on. Four recovered, the fifth being admitted late, after generalized peritonitis had occurred. The three main etiologic factors causing this

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(8) Brit. Med. Jour., Feb. 19, 1921.

condition are possible antenatal conditions, developmental causes, and defects in function. A defect in the development or function of the mesoblastic layer of the abdominal wall is the most frequent cause. Treatment to be successful, must be immediate and consists of open operation.

INFANT FEEDING

Three Pertinent Questions on Maternal Feeding. Does a divergence of opinion exist, asks W. A. Mulherin[1] between some of the text-books on pediatrics and the actual practice of a large number of pediatricians on the following points?

1. Is uncomplicated pregnancy an indication for immediate weaning?
2. Is immediate weaning advisable in mild typhoid fever?
3. More positiveness should exist regarding the advantages of complemental feeding over the method of alternating the breast and the bottle.

Since uncomplicated pregnancy in the large majority of cases only weakens the quality of the milk and diminishes the flow, slow weaning is more rational. This procedure has been followed by uniformly good results in the author's practice. While the advisability of immediate weaning in severe cases of typhoid fever is not questioned, slow weaning is indicated in the mild cases. There is not much danger of a typhoid mother transmitting the infection through her milk to the baby and the danger of contamination due to the intimate contact is quite small. The author reports three cases of typhoid fever in nursing mothers who continued to nurse their babies and made uneventful recoveries, and their babies did not contract typhoid fever.

It is a serious mistake to give supplemental feeding when complemental feeding can be given because the mother's breasts receiving less stimulation slowly cease to function, while with complemental breast feeding, the secretion of breast milk can be established, maintained and reinstituted.

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(1) Jour. Amer. Med. Ass'n., Sept. 25, 1921.

Ability to Nurse in Sick Women. Anne Moldenhauer[2] reports her observation on thirty women who continued to nurse though affected with various diseases. In six cases of mastitis she allowed the infant to continue to nurse from both breasts. She found that in three cases this was not feasible because the wound of incision extended to the areola or because of very extensive mastitis. Pain, fever, and impaired general condition did not constitute contraindication to nursing, except in one case of bilateral mastitis where the pain was extremely severe. The secretion of the affected breast remained the same as before the infection or it returned to normal with the disappearance of the local symptoms and the return of the mother's well-being. The function of the unaffected breast was always maintained. In one case there was a compensatory increase. In no instance was the child's health injured even when there was considerable suppuration.

In nine surgical cases some of which were infected, nursing was continued preceding and following operation. It was found that immediately after operation with poor general condition and liquid diet, the milk decreased, but with the maintenance of regular nursing periods and with improvement of the mother's condition, the secretion returned to normal. Neither the condition of the mother nor of the child was unfavorably influenced by nursing after aseptic or septic operations. In four patients with nervous or mental disease nursing was continued without injury to mother or child. In all eleven cases of acute infectious disease in the mother transmission to the child did not occur, although nursing was continued. Neither the infection nor the fever is indication for weaning. In almost all cases there was a decrease in the milk supply during the fever period, but with its disappearance and with improvement of the mother's general condition, the supply invariably increased. The author concludes that with the exception of open tuberculosis and, possibly, dysentery, it should be attempted in all surgical or internal infections or aseptic, acute or chronic diseases to continue nursing.

[In the final analysis the question whether a sick

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(2) Zeitschr. f. Kinderheilk., vol. 29, 1921, Nos. 1-2.

woman should nurse her baby must be decided upon the individual merits of the case. We are also in favor of breast feeding wherever and whenever it is possible. In the case of a sick mother even a most conservative physician will be compelled to decide upon the basis of the actual conditions present. A mother who is acutely ill, who is nervous, epileptic or insane, may not be able to nurse her baby advantageously. We repeat, each case must be decided upon its individual merits, using mature judgment and common sense.—Ed.]

Simplified. Infant Feeding. F. H. Richardson[3] reports that he impresses on the mother that she should get away from the baby at least once in twenty-four hours, for the sake of both of them; that she should get enough sleep, eight hours representing a minimum rather than a maximum; and that worry is a great milk reducer. If the doctor can keep up the baby's weight and satisfy its appetite with complementary feeding, and give the mother confident assurance of ultimate success, he can generally obviate the untoward influence of worry.

The mother may eat whatever she pleases, within ordinary bounds of reason, provided it does not cause indigestion on her part. The baby will not be affected by what she eats. Excessive amounts of milk, cocoa, beer, or even water, do not necessarily, or even usually, aid in improving either the quality or the quantity of milk produced. Such excesses, on the contrary, usually end in harm, by spoiling the good appetite so necessary to lactation, if not actually upsetting the digestion. The same regime that produces health and strength and bodily well-being produces milk. No special diet can greatly modify the chemical constituents of the milk.

A laboratory test of the character of the milk is never of any practical use. The only test that is worth while is the practical one of its effect on the baby. If the infant is hungry, or is failing to gain, he should have complementary feedings until the breast supply becomes adequate, as shown by these two criteria.

The milk never disappears beyond recall suddenly, say, within twenty-four or forty-eight hours. Such an

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(3) New York Med. Jour., Dec. 18, 1920.

apparent vanishing of lactation is always evanescent, if complementary feeding is instituted promptly. The temporary diminution of the milk secretion can in this way always be made up for, the baby be tided over, and enforced weaning be done away with. The care of the nipples is a most important phase of the periods of later gestation and lactation.

If we agree to start any child that comes to us on a mixture of one part cow's milk and two parts water, boiled together for three minutes, with no sugar added, we shall at least be giving a mixture that can do no harm.

By multiplying the number of pounds the baby weighs by fifty, which is an average calculation of the requirements of the average child for each pound each day, we shall arrive at the number of calories that we must eventually give the baby in assimilable form. Starting with the trial or initial formula of ten ounces of milk and twenty ounces of water, worth two hundred calories, it may gradually be strengthened until it has been brought up to the number of calories that have been determined upon as a normal daily feeding for the baby. A useful servant is some form of dry milk. The successful care of any goodly proportion of premature babies presupposes the employment of breast milk in all cases. Breast milk is not the rare thing we like to consider it; we can get it for the premature infant, if we go after it.

[This paper contains wholesome advice based upon real experience and successful practice. We are in full accord with Richardson.—Ed.]

The Necessity of Clear Thinking in Milk Modification. It is pointed out by L. W. Hill[4] that while whole milk dilution is simple, it has its limitations, in that it is not at all elastic and in many cases the ratios which one would like to have between the fat and the protein in the mixtures can not be obtained, owing to the fact that if the milk is diluted one-third or one-half, as the case may be, the fat and the protein will each be diluted in the same proportion. The author suggests the following principles of calculation:

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(4) Jour. Amer. Med. Ass'n., March 5, 1921.

Amount of Cream: In a 16 ounce mixture the number of ounces of gravity cream required is always the same as the fat percentage desired. In a 32 ounce mixture the number of ounces of gravity cream required is always twice the fat percentage desired; in a 48 ounce mixture, three times. There are similar factors for the other mixtures (20, 24 and 40 ounce mixtures). This does away with all paper calculations, as the whole thing is so simple that it can be done in the head in a moment:

	Fat Factor	Protein Factor
16 ounce mixture..............	1.00	5.00
20 ounce mixture..............	1.25	6.25
24 ounce mixture..............	1.50	7.5
32 ounce mixture..............	2.0	10.0
40 ounce mixture..............	2.50	12.5
48 ounce mixture..............	3.0	15.0

SUGAR TABLE

One level tablespoonful of lactose raises the sugar percentage:

2.40	per cent.	in a	16	ounce mixture
2.00	per cent.	in a	20	ounce mixture
1.60	per cent.	in a	24	ounce mixture
1.20	per cent.	in a	16	ounce mixture
100	per cent.	in a	40	ounce mixture
.80	per cent.	in a	48	ounce mixture

For example, suppose we wish a 32 ounce mixture containing: fat 2.5; sugar, 6, and protein, 1 per cent.

To determine:

1. Gravity cream: 2.5 x 2 (fat factor for 32 oz.) equals 5 oz. gravity cream.

2. Skimmed milk: 1.00 x 10 (protein factor for 32 oz.) equals skimmed milk plus cream. Minus 5 oz. cream equals 5 oz. skimmed milk.

3. Sugar:

(*a*) Sugar furnished by skimmed milk and cream: 1.00 (protein percentage desired x 1½ equals 1.50 per cent. sugar.

(*b*) Sugar to add as dry lactose: 6.00 minus 1.50 equals 4.50 per cent. more to be added. One level tablespoonful of dry milk sugar added to a 32 oz. mixture raises the sugar percentage 1.2 per cent. Therefore add 4 level tablespoonfuls of milk sugar.

In a 16 ounce mixture the number of ounces of skimmed milk, plus cream required, is always five times the percentage of protein desired; in a 32 ounce mixture, ten times; in a 48 ounce mixture, fifteen times. Similar factors exist for the other mixtures (20 ounce, 24 ounce, etc.). The number of ounces of cream and the number of ounces of skimmed milk plus cream having been determined, the amount of skimmed milk necessary is easily obtained by subtracting the one from the other.

Some sugar is, of course, put in with the cream and skimmed milk, as both of these contain sugar. In order to know how much more sugar to add in the form of dry sugar to bring the total up to the desired percentage, it is necessary first to know what percentage the cream and skimmed milk furnished. The percentage of sugar furnished by the cream and skimmed milk is always 1½ times the percentage of protein desired. The extra sugar to be added is figured from the sugar table, showing how much the percentage of sugar is increased in any mixture by adding a level tablespoonful of sugar.

Lactic Acid Milk. Sherman and Lohnes[5] state that they have worked out a method for the use of lactic acid milk which is very simple.

It is well known that the fermentation of lactic acid milks continues up to a certain point of fermentation—that is, of acidity. At about 60, as measured by decinormal sodium hydroxide solution, spontaneous fine clotting occurs. At about 170 to 190 the acidity destroys or renders inactive the fermenting bacillus, and the process consequently of itself ceases.

The authors have taken the milk, either skimmed or whole, and in the morning added the ferment (1 ounce of ferment to 31 ounces of milk) and stood it away in a warm place till a convenient time the next morning. Knowing by numerous tests that the acidity has reached about 170 to 190 by that time, they dilute the skimmed or whole lactic acid milk with an equal amount of skimmed or whole sweet milk that has been boiled, and then have the desired acidity of from 75 to 95. Because the acidity is above 60, there occurs a spontaneous fine clotting of the added sweet milks with a resulting

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(5) Jour. Amer. Med. Ass'n., Oct. 2, 1920.

homogeneous, smooth, clotted mixture. This mixture of lactic acid and sweet milks is then boiled or not, as desired. It is then further modified, as the case demands, and put away on the ice. It keeps nicely, changing very little in the following twenty-four hours, the change being much less if boiled a second time.

This is a simple method, which can be carried out even in the household of the ignorant. It requires merely the making of a certain amount of whole or skimmed lactic acid milk, to which can be added an equal amount, or more, of whole or skimmed boiled sweet milk. The small clots, which are formed during the process of fermentation, are flocculent in character and are very easily digested. Should the infant reject the lactic acid milk of correct acidity, the curds are small and soft, and show evidence of prompt digestion. To supply the carbohydrate needs the authors have added corn syrup; first, because of its contained variety of sugars, and secondly, because it is cheap. They have had cultures taken of an unopened can, and have found it germ-free.

Their series of cases tested on lactic acid milks has amounted to only about twenty-five. Given a mixture of the proper acidity, they find the infants very quickly seem to like it, and furthermore, those with rebellious stomachs retain it nicely. The effect on the stools is marked and quickly obtained. The foul, putrefactive odor, so common in hospital cases of this class, promptly ceases, and the stools become even, smooth, and of good color.

The infants seem rapidly to become less toxic, as is shown by the disappearance of various signs and symptoms:

Their appetites improve, and they take the formula well and are likely to retain it.

They soon lose their ashy-gray color. Their mucous membrane, especially of the lips, shows a decided betterment in color. This occurs before the gain in weight has been marked.

Their temperature becomes more stable, and an early monothermia occurs.

They soon become less fretful—in other words, are happier.

Their sugar tolerance seems less easily broken, and gas formation is less likely to complicate the condition.

The loss of weight, or stationary weight, is soon likely to be overcome by a substantial weekly gain, and caloric feeding seems easier to reach.

The age of the infant seems to make very little difference with lactic acid milks. Finkelstein does not advise protein milk before three months of age, though this rule is not inflexible. But the authors have used lactic acid milks in the very young with as good results as with older infants. As an example, one of their patients was a premature infant of seven months' gestation, weighing 4 pounds at birth. At the end of its first month it weighed 5 pounds. It was started on its second day of age with a one-half skimmed lactic acid milk. This was gradually raised to a two-thirds mixture of lactic acid milk, which was made of one-half skimmed lactic acid milk and one-half whole lactic acid milk. This is approximately a 2 per cent. fat mixture.

The therapeutic effects of lactic acid milk or buttermilk are too often only superficially understood. The curds formed from it are small and easily cared for. The acidity seems to stimulate both the gastric and the intestinal function, and the sterilization of the protein fermentation of the intestinal canal is marked. This change of intestinal state markedly lessens the absorption of toxic products, and the whole process of metabolism is hence beneficially affected.

[The method suggested by the authors commends itself and deserves extensive trial.—Ed.]

Effect and Use of Flours in the Nutrition of Infants. H. Aron[6] has conducted feeding experiments with ordinary flour and with bread flour (powdered bread crust) in order to determine whether other constituents present in the flour besides starch may play a rôle in the action of flour. While whole flour is rich in extractive substances because of its bran content, it is changed to a more suitable form for infants in the process of making bread. There are two phases in the preparation of bread, the kneading of the dough and the baking. In the kneading, the yeast ferments and the wheat ferments become

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(6) Jahrb. f. Kinderhlk., vol. 92, 1920.

active. In the baking process sugar and amino acids react and in the presence of water melanoidines, the substances which impart the brown color and the pleasant odor to the bread crust, are formed. These melanoidines are essentially identical with the substances present in the malt extract, outside of the maltose, and which are responsible for its color, taste and odor. The bread flour was prepared in larger quantities in such a way that an ordinary dough of war flour was kept hot as long as possible, then baked slowly in thin layers and finally was ground finely. The results with this flour were very good. Metabolism experiments indicated good utilization in larger quantities than are usually borne of ordinary flour.

The Salt Content of Human Milk. The mineral constituents of human milk and of the various modifications of cow's milk ordinarily used in infant feeding have been studied by W. R. Sisson and W. Denis.[7] Their objective was to obtain evidence as to whether some of the more obscure nutritional disorders of infants might be due to abnormalities in the mineral content of the food, as it is perfectly conceivable that an excess of inorganic salts may be as deleterious to nutrition as a deficiency. In this report only the chlorides of human milk are considered.

As a result of the examination of about 400 samples of milk, taken from the first day to the seventeenth month of lactation, the authors have found that after the first week, during which slighly higher figures prevail, the average chloride content of breast milk varies but little, being about 50 mg. per 100 c.c. of milk. These average figures are of little practical importance on account of the huge variations that may occur.

It has been found that mothers may give milk with a constant chlorine content as low as 20 mg. per 100 c.c. or as high as 110 mg. Certain mothers show a variation of 100 per cent. or more in the chlorine content of specimens of milk obtained over a period of from twenty-four to forty-eight hours.

From the authors' present observations on human milk, they feel that diet is not the essential cause in the

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(7) Jour. Amer. Med. Ass'n., Aug. 28, 1920.

variation in the chlorine content, and that some other factor must play an important part.

As it is well established that the percentage of chlorine in the blood is constant, it seemed possible that the threshold for chlorine secretion may vary in different subjects and also may be very unstable in certain mothers, and thus explain the variation found in different specimens. It was found that in most instances the stable, phlegmatic type of mother gave a milk that showed essentially no variation in the chlorine concentration in specimens collected every three hours during the day. The mothers whose milk showed marked variation in almost all instances were very unstable types. There was no constant relation between the amount of milk obtained from these mothers and the chlorine content of their milk. Babies of the phlegmatic mothers giving an adequate amount of milk always gained satisfactorily, while in many instances the babies of the "nervous" mothers developed diarrhea and failed to gain normally.

Disadvantages of Dried Milk in Infant Feeding. J. Burnet[1] has frequently encountered cases in which this feeding proved quite unsatisfactory and in which infants so fed developed anemia, rickets, or scorbutus, and at any rate did not thrive. He reports four cases illustrating this. It is true that these children do not as a rule vomit, but they do not thrive so well as when given ordinary milk mixtures. The official recognition of dried milk by public health authorities who usually have no knowledge of infant feeding is in his opinion very harmful.

[Dried milk will continue to be used as a complemental feeding temporarily during long sea voyages and for overland journeys, also in cases where fresh milk can not be obtained. A wholesale condemnation of dried milk does not seem justifiable on the basis of four cases. —Ed.]

NUTRITION AND DISORDERS OF NUTRITION

The Influence of the Acid-Base Relation in the Diet on the Metabolism of the Child. G. Baumgardt[2] undertook the experimental work forming the basis of this article, in order to test Berg's experimental work. Berg inquired into the importance of the reaction of food for the metabolism. He found that the optimal reaction for oxidative and hydrolytic processes occurs when there is a sufficient excess of base (25 milligram equivalents for a man weighing 70 kg.). In that case the protein requirements are minimal, whereas when there is a lack of bases the protein requirements may be raised 300 per cent. The author tried to establish whether with an excess of alkali in the food, the nitrogen requirements are less than with an excess of acid and whether by giving food rich in alkalis less calories are required than with a diet rich in acids.

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[1] Practitioner, March, 1921.
[2] Archiv. f. Kinderheilk, vol. 69, 1921, Nos. 3-4.

The experiments consisted of the determination of nitrogen balance, respiratory determinations and calorimetric tests of food, feces and urine in four boys of 11 to 13 years who were considered normal. The results were uniform. The diet consisted of the ordinary hospital food with periods of marked alkalinization and acidification respectively. It was found that neither the nitrogen metabolism nor the energy requirements were influenced by widest variations in the acid-base relation. Even when large quantities of inorganic acids were given, for a period of ten weeks, the boy apparently did not need to attack his mineral constituents. There is a constancy of the mineral contents which corresponds to the constancy of the alkali content of the blood. The significance of the ammonium for the neutralization of the acids and for the protection of the mineral supply is emphasized. The author's findings correspond with those of Jansen.

Food Requirements of Children: Total Caloric Requirements. In calculating the total caloric requirements of children L. E. Holt and Helen L. Fales[3] consider separately the component parts of which the total is made up. These are the requirements for basal metabolism, for growth, for muscular activity and the food values lost in the excreta. The basal requirements, which have been determined by Benedict and Talbot, are highest per kilo at about nine months and steadily fall

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(3) Amer. Jour. Dis. Child., January, 1921.

from this time up to adult life. The food value normally lost in the excreta is a nearly uniform proportion of the intake, about 10 per cent., for all ages after infancy. The requirements for growth are greatest during the period when growth is most active, namely, during the first year of life and during adolescence. They are nearly uniform from the fourth to the tenth or eleventh years. The average for three factors—basal, growth requirements and food values lost in excreta—are nearly uniform for children of the same weight living under similar conditions. The requirement for activity is the only factor which varies widely with different individuals. The great differences in the calculations of different writers who have estimated theoretical values for total calories per kilo for children are in part due to the fact that they have not sufficiently considered the different component parts which make up the total.

The average caloric requirement of children according to the author's observations is about 100 calories per kilo at an age of 1 year (about 9.5 kilos). For boys it falls to about 80 calories at 6 years (about 20 kilos) and remains practically constant at this value up to the age of 15 years, the increasing requirements for activity being met by the reduction in basal requirements per kilo. After a weight of 50 kilos (about 15 years), is reached the calories per kilo can rapidly be reduced to adult standards, about 48 calories per kilo. The requirement for girls falls to 76 calories per kilo at 6 years (about 20 kilos), continues at this value until the tenth year. During the tenth year it rises because the basal requirement is nearly constant while there is an increase in needs for growth and activity. The requirement remains at 80 calories per kilo until growth is complete, then falls rapidly to adult standards, about 44 calories per kilo.

In the authors' calculation they have allowed a much higher value for calories per kilo during adolescence than have others. This seems to be absolutely essential, because of the increased growth needs at this time and the large requirement for muscular activity. According to their allowance the total daily caloric requirement of children of both sexes during adolescence exceeds by nearly 1,000 calories the requirements of the adult man or woman of moderate activity. Children who are under weight require more calories per kilo than those who are of average weight for their age. Children who are over weight require fewer calories per kilo than those of average weight. The schedule here proposed is a tentative one and is based on present knowledge, which is in many respects incomplete. There are a number of points which must be studied more fully before definite standards can be established.

It seems the right procedure to allow for children during the period of adolescence more calories than the adult ration, and as growth needs end to diminish the caloric allowance to the adult standard. The authors quite agree with Benedict's recent statement: "It is still, however, the best practice to give a most liberal diet to children, since the greater part of the evidence on under weight indicates that children usually receive too little rather than too much food."

Some Phases of the Pathology of Nutrition in Infancy and Childhood. This discussion by W. McKim Marriott[4] is concerned with a consideration of some of the alterations in the physiologic and chemical processes occurring in the infant's body and with the methods of restoration of normal processes. The clinical picture presented by infants who have lapsed into a toxic, shock-like condition following severe diarrhea may be explained on the basis of the water loss from the body, which is known to occur. The author does not deny that factors other than water loss are operative but he believes that it is unnecessary to assume the existence of other factors in order to explain observed facts. If poisons are accountable for the symptoms, their origin, nature and mode of action have not yet been explained. He discusses the supposed toxic action of sugar and salt. Efforts to produce the symptoms in animals by feeding or injection of intestinal contents or extracts of intestinal contents of these infants have failed. Marriott observed a marked degree of anhydremia in infants suffering from pneumonia, otitis media and from pyelitis. If food is given to an individual who is anhydremic,

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(4) Amer. Jour. Dis. Child., December, 1920.

even though diarrhea is not present it is likely to result in diarrhea. The water deficit of anhydremic patients is approximately the same as the amount of weight lost; it may be from 300 to 1,500 gm., even in young infants. The most efficient means of introducing water into infants of this type is by intraperitoneal injection. Ringer's solution is recommended. In order to spare protein destruction the administration of carbohydrates in the form of glucose intravenously is desirable. In athrepsia, from the metabolic standpoint, the most outstanding features are an inability to utilize food and a negative nitrogen and mineral salt balance.

The circulatory changes occurring in athreptic infants are a slow, small and weak pulse; subnormal surface temperature; low hemoglobin and red blood cell count; low concentration of the protein contents of the blood serum. Studies of the blood volume revealed that athreptic infants had a lower blood volume, both absolutely and in relation to the body weight, indicating a considerable destruction of the blood as a result of the decrease in blood volume; the volume flow was also found to be diminished. It was often less than one-fifth, occasionally less than one-tenth the normal. During convalescence it was found to increase. Corpuscular concentration of the capillary blood was also found; it may explain the gray color of the skin. Discussing the difference in cow's milk and human milk, Marriott emphasizes the high buffer value of cow's milk, *i. e.*, its capacity to unite with relatively large amounts of acid or alkali without a great change in chemical reaction. The acidity of the human milk expressed in terms of hydrogen ion-concentration is far greater than that of cow's milk. Those foods which have been found empirically to be the best tolerated by athreptic infants are those which have a low buffer value or in which the buffer is already partly neutralized. Breast milk, lactic acid and protein milk are examples.

Physiology and Pathology of Gastric Digestion in the Infant. The occurrence of pepsin in the gastric juice of the infant has been proven, but the question whether it is active has been debated. In order to solve it the gastric content was examined for products of protein digestion (pepton filtrate-N). Artificial digestion experiments with the gastric contents were conducted and the acidity of the stomach was determined. H. Davidsohn[6] reaches the conclusion that neither by the proof of the presence of peptone in the gastric contents nor by artificial experiments of digestion, could peptic digestion be proved. Only physiologic chemical methods are adapted for the determination of the acidity of the gastric contents after a milk diet. The objections to the hydrogen ion ($H^{\cdot}$) determination in the aspirated gastric contents are unfounded. The composition of the gastric contents is different in the naturally and artificially fed infant, that is, the animal fed on full cow's milk. Therefore, the view obtained from animal experiments of the rapid coagulation of the milk, the rapid separation of the whey and the solution of the casein coagulum is not applicable to the infant. The acidity of the gastric contents of the naturally and artificially fed infant in the average and in the large majority of cases amounts to $(H^{\cdot}) = 1 \times 10^{-5}$. In the breast-fed infant after the eighth month the acidity is considerably greater than in the artificially fed infant. The peptic digestion in the infant begins with an acidity of $(H^{\cdot}) = 1 \times 10^{-4}$ and becomes optimal at $(H^{\cdot}) = 2 \times 10^{-2}$.

Later experiments were also conducted by H. Davidsohn[7] on the following subjects:

1. The experimental foundation of the objection to the aspiration of small portions of gastric contents.
2. The furnishing of new experimental material on the acidity of the infants' stomach and the establishment of standard acidity values of the gastric contents for various food mixtures.
3. The acidity of older artificially fed infants after cow's milk, rsp. milk dilutions.
4. The influence of constitutional anomalies, *e. g.* grippe infections on the ($H^{\cdot}$)—hydrogen ion concentration—of the gastric contents.

As the result of numerous experiments, it was found that:

1. The aspiration of the gastric content in a small

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(6) Archiv. f. Kinderhk., 1921, vol. 69, No. 2.
(7) Archiv. f. Kinderhlk., 1921, vol. 69, Nos. 3-4.

first and a larger second portion for the purpose of acidity determination leads very frequently to deviating values.

2. The $(H^{\cdot})$ of the gastric content was determined for different artificial foods and it was found that on the average it amounted to

⅓ whole milk P_H (acidity) = 5.1; $(H^{\cdot})$ = 0.8×10^{-5}
⅔ " " ' " = 5.0; " = 1.0×10^{-5}
Whole milk " " = 5.6; " = 0.3×10^{-5}
Albumin milk " " = 4.7; " = 1.9×10^{-5}
Buttermilk " " = 4.3; " = 5.2×10^{-5}

It was found that the factors determining $(H^{\cdot})$ are: (1) HCl content of the gastric juice. (2) The HCl binding power of the milk which varies with different kinds of milk. (3) The secretory stimulus of the milk. (4) The age of the infant (of significance only in the breast-fed). (5) The constitution of the child. (6) The motility of the stomach. (7) The condition of the child. (8) The reaction of the milk.

3. By increasing the rest period of the stomach, the $(H^{\cdot})$ of the contents increases only slightly.

4. In the artificially fed infant, the $(H^{\cdot})$ of the gastric content does not increase appreciably during the nursing period.

5. Breast-fed infants from 1 to 6 months show a low $(H^{\cdot})$ of the gastric contents, similarly to the artificially fed; from the seventh month on the acidity increases rapidly and in a number of infants reaches values which permit moderate or good peptic digestion.

6. The HCl secretion is therefore a function which is incomplete during earliest life and develops progressively.

7. The lack of increase of the $(H^{\cdot})$ in the gastric content in the older artificially fed infant is attributed to the greater acid binding faculty of cow milk and the more marked secretion stimulus of breast milk.

8. Of nineteen infants with exudative diathesis, seven showed varying or increased acid value of the $(H^{\cdot})$ of the gastric content.

9. In grippe infection there was a diminution of the $(H^{\cdot})$ in the gastric content and a decrease of gastric mo-

tility. These changes lasted for a considerable time after the infection and as in exudative diathesis they were more marked the more severe the disease.

Diseases of Infants Due to Prolonged Feeding with Excess of Carbohydrates. C. E. Bloch[8] states that the diseases arising from prolonged feeding with carbohydrates, with the relative exclusion of animal fats and proteins, vary apparently according to the child's age and original state of health and to the length of time during which the child is subject to the harmful diet. It has not yet been possible to differentiate various forms of the disease, corresponding with the various carbohydrates. All kinds of starch and sugar seem equally injurious when given alone and for a prolonged period.

The conditions brought about by a diet consisting chiefly of carbohydrates resemble those due to chronic inanition. The store of fat and protein is drawn upon, and being weak from birth the child loses weight rapidly immediately suckling ceases. It gradually gains the appearance which is usually termed atrophic, but Bloch prefers the term atrophia amylogenetica to distinguish it from the true atrophy of children, from which it differs both in origin and appearance. The treatment of the two types is also to some extent different. If the child is a few months old, and particularly when it is strong, the excessive carbohydrate diet seems to cause quite different symptoms. If the child has been given milk from time to time the changes may be quite characteristic.

A spongy and hydremic condition of the tissues develops, which is a direct consequence of the carbohydrate diet. If this is even partly changed the edema disappears. In well-marked cases the children have an appearance similar to that of Bright's disease, but the urine never contains albumin or kidney elements. In the primary stage of this disease the tissue is only puffy and spongy, and this stage is the one more frequently met with.

The plump appearance may not be due to edema, as in the previous case, but to general sclerotic infiltration

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(8) Brit. Med. Jour., Feb. 26, 1921.

of the subcutaneous tissues. This gives the child a peculiar mask-like appearance. From the author's large and gradually accumulated experience of these diseases, it appears that it is the delicate and newly born infants that are most susceptible to the atrophic form, and the stronger and somewhat older ones mostly suffer from dystrophy, particularly if from time to time they have had a little milk, or milky foods, in addition to the carbohydrate diet. Common to all children fed on a carbohydrate diet is their great susceptibility to all infections. The prognosis of these cases is always very serious and distinctly unfavorable when the vital parts are degenerated. The most important point in the treatment is careful nursing and the use of stimulants. Furthermore, their diet must be altered so that they obtain protein and fat. The best way of doing this is to give them a wet-nurse. If one is not available they must be fed on a diet the basis of which is sterile milk, diluted according to age.

Apart from the diet, the author administers preparations containing tannin, preferably acorn cocoa in milk. If it does not agree, he uses albumin tannate, which has the advantage over metallic salts of being non-toxic.

[The author confirms Czerny's description of starch injury after the long-continued use of carbohydrate or starch diet.—ED.]

The Use of Atropine in Treatment of the Hypertonic Infant. A. D. Kaiser[9] states that the hypertonic infant presents a definite clinical picture, due to a disturbance of the autonomic nervous system which gives rise to physical and psychic disturbances.

The usual manifestations are irregular vomiting often with visible peristalsis, constipation, malnutrition, muscular irritability, representing the physical defects, and with insomnia and crying as psychic disturbances. The diet usually needs no change in the hypertonic infant and the food is well digested. A solution of atropine gives early relief of symptoms in these cases and thereby metabolism is increased, bringing about the desired gain in weight. The use of atropine is not dangerous if the drug be given in guarded doses and the early toxic symp-

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(9) New York Med. Jour., Dec. 18, 1920.

toms are noted. The author reports three cases supporting his statements.

Hypodermic Injections of Milk in Treatment of Intolerance of Milk in Nurslings. E. Weil[1] first recommended this method of treatment at the beginning of last year. It has been tried since then by many others with a good deal of success, while more than a year's further experience, mainly in the Children's Clinic at Lyons, of which he is head, has convinced the author of the advantage to be derived in many cases from its use.

It is applied particularly to infants suffering from digestive intolerance of milk, with frequent vomiting, diarrhea, constipation and a tendency to convulsions. These symptoms soon show themselves, and occur as much in breast-fed infants as in those fed with cow's milk. The treatment is simple. The child is given hypodermic injections of the same milk to which it is intolerant. From 5 to 10 c. c. are given by hypodermic injection, and one injection is usually enough. In some cases a second or a third injection is given, with an interval of two days. The mother's milk may be used raw or boiled, but cow's milk must be boiled or heated to 110° C. for twenty minutes.

The injection is followed by a slight reaction and a slight rise of temperature. The results, Weill says, are remarkable; the child stops crying, and the restlessness, vomiting and diarrhea cease, and these effects are permanent.

Opinions are still divided about the effect of these injections. Variot is skeptical about them. Ganjoux, of Montpellier, has made observations upon breast-fed and bottle-fed babies. In twelve breast-fed babies, in whom all other methods of treatment had failed, he injected aseptic human milk or sterilized cow's milk, giving 1 c. c. on the first day, 2 c. c. on the second, and 5 c. c. on the third day. In eight cases the vomiting ceased; in three a small abscess hindered the cure, and in one the result was quite negative.

In bottle-fed babies he made a distinction between children below and above five months. Below five months

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(1) Jour. des Practiciens, Sept. 20, 1920, and Médecine, August, 1920.

the vomiting was associated with diarrhea. In sixteen out of twenty-eight cases, after an injection of 1 c. c. on the first day, followed by one each on the two next days, the vomiting ceased entirely. In the remaining twelve cases, only in six was the vomiting stopped.

For children over five months, the results were equally encouraging. These patients were submitted for a week to a diet free from milk. On the third to the seventh day the first series of injections was begun: 0.5 c. c. on the first day, 1 c. c. on the second, and 2 c. c. on the third. A small feed, correctly prepared, was then given by bottle, and as a rule there was no further vomiting. If there was a return, a new series of injections was given at once, and this treatment always proved effectual.

Weill insists upon a proper choice of patients, who should be those presenting an habitual intolerance for milk, and upon the use of fresh milk heated for twenty-five minutes in a sand-bath.

[This interesting investigation is worthy of wider application and clinical confirmation.—Ed.]

Dyspepsia and Mal-assimilation in Children. H. C. Cameron[2] believes that the uniformity with which young infants react to prejudicial influences of all sorts by signs of gastro-intestinal disturbance has in the past, concentrated attention somewhat too exclusively upon the control of the diet. As a rule, any infant who comes under the author's care for dyspepsia is being fed upon some diet which, within his experience, has given very satisfactory results in innumerable cases.

The special liability of the young child to gastro-intestinal disturbances depends not only upon his high demand for food and the strain thereby imposed upon digestion, but also upon two further characteristic features of infancy—a low immunity against catarrhal infections of all sorts, and a highly sensitive and uncontrolled nervous system.

The infective conditions which cause diarrhea and vomiting in infants are, comparatively, seldom intestinal. In practice, gastro-intestinal disturbance symptomatic of parenteral infection is probably that which is most frequently met with, at least in infants fed upon the

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(2) Practitioner, March, 1921.

breast. It is characterized by the suddenness of its onset, often in the midst of perfect health. In this it contrasts with the onset, usually gradual, of primary dyspepsia of purely alimentary origin.

It is important to recognize the underlying element of infection, because in this symptomatic dyspepsia nothing is to be gained, as a rule, by radical alteration in the character of the diet. We can not hope, in infants. more than in adults, to cut short infective processes by modification of the diet. It is enough in most cases, when the infant is artificially fed, to cut down the amount of food by a third or a quarter, and to make up the volume of fluid by additional dilution with water. Primary dyspepsia may be produced by sheer over-feeding, especially by excess of fat or sugar.

The type of malnutrition and indigestion characterized by an excess of the putrefactive and a dimunition of the fermentative processes of the bowel is in general very readily controlled by a diet modified so as to keep the fat and protein at a low level, while fermentable carbohydrate is given freely. The author uses Keller's modification of Liebig's original formula. In the case of infants younger than three months, or as an alternative method, butter-milk with a high percentage of added lactose may be used.

There are a number of babies suffering severely from dyspepsia, in whose case experience has convinced the author that the primary fault is sleeplessness, restlessness, crying, and emotional display. Nervousness is often inherited. More often it is the result of inexpert and timid handling. Normally, the young infant should be asleep for 18 or 20 hours of the day. Under such conditions, its energy output is comparatively low, and its need for food in correspondence. On the other hand, if, except for a few hours of broken sleep, its time is passed wide awake, crying and struggling, the demand for food becomes greatly increased. Yet its restlessness prevents efficient suction, and without efficient suction the breast secretion rapidly declines. In this condition, we have what the author believes to be the most frequent cause of failure to nurse at the breast among highly-strung mothers and their equally excitable offspring.

The infant suffering from nervous dyspepsia is commonly thin, agile with astonishingly powerful movements. The abdomen is not distended as in primary dyspepsia, but retracted, with the outline of the recti abdominales showing prominently because of the increased muscular tone. The limbs are apt to be held stiff and rigid, the hands clenched. The facial expression constantly changes from alertness and extreme intelligence to anxiety and fretfulness. Sleep is in snatches. Explosive vomiting, often immediately after a meal, and lienteric diarrhea, are commonly present in greater or less degree. Treatment is only successful when it controls the underlying cause—the nervous unrest. A good nurse who knows how to handle restless infants is an invaluable part of the treatment. Prolonged hot baths, lasting as long as a quarter of an hour, while the temperature is kept constantly at 105° F. by the addition of hot water, may be given two or three times in the day until sleep is secured. If this treatment is not successful sufficient bromide and chloral to break the vicious circle of restlessness may be prescribed.

The author also describes a form of dyspepsia in older children, consequent upon nutritional defect, with amyotonic vasomotor disturbances and nervous exhaustion. Treatment of such a condition must be concerned with the education of the children with their mental, moral, and physical discipline. The whole deterioration of health, in many cases, is due to some focus of chronic infection such as imbedded tonsils which are septic. A low immunity against catarrhal infection of nose and throat is generally found in children of such depressed vitality. The child must, if possible, be removed from management which exhausts and renders sensitive the whole nervous system. Immediate improvement may follow upon removal to a good school. Massage, physical exercises, drill, dancing, eurythmics play an important part.

[We are sceptical of nervousness as the sole cause of severe dyspepsia or nutritional disturbance. A properly fed, thriving baby is usually a happy baby.—Ed.]

Further Studies in Thick Cereal Feeding in Malnutrition in Infancy. H. R. Mixsell[3] prepares a thick cereal formula in the following way: A fat-free milk, or one which averages under 1 per cent in fat is used as the liquid basis of the mixture. The cereal used by preference is farina on account of its colloidal qualities. The proportion of this present mixture used was increased to 1 tablespoon of farina to 5 or 6 ounces of the skimmed or fat-free milk. Cane sugar and dextri-maltose are added in equal quantities, using 2 level tablespoons of each to 30 ounces of the mixture. All this is cooked for from 30 to 60 minutes, or until the resulting mixture is thick and tenacious.

As a rule, there is not the increase in the number of stools that one would expect to find from the high sugar and starch content. A tendency to constipation is generally the rule. A combination of several carbohydrates in the same food can be given without taxing the power of the organism to utilize sugar, whereas when a single carbohydrate is used this may not be the case. The farina mixture, being a "polycarbohydrate" mixture of milk sugar, malt sugar, cane sugar, dextrins, and starch, comes under this category. The malt sugar is absorbed first, then the cane sugar and milk sugar, next the dextrins, and finally the starch. The organism is thus enabled to utilize the sugar without a sudden overdose, and accordingly the child gains and there is not the tendency toward a carbohydrate diarrhea which we might expect to get with a single carbohydrate.

When first put on this mixture, there is usually some difficulty in getting the baby to take the spoon feeding. The cane sugar, being much sweeter than the dextri-maltose, should be increased accordingly, and the child will generally take it.

When the child is well accustomed to the mixture and has started to gain, from 2 to 6 ounces of a green vegetable puree are added. This may be used as early as the sixth month. Celery, string beans, spinach, carrots and young turnips are the vegetables of choice. These supply not only a few extra calories, but also salts, and the antineuritic or water-soluble *B*, vitamine.

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(3) Archiv. Pediat., August, 1920.

Having observed two series of cases, comprising twenty-two in all, the author feels that this method of feeding will prove of great value in selected infants who gain badly or very slowly.

Causes and Management of Athrepsia. Athrepsia, W. Weston[4] thinks, is a condition of gradual starvation dependent upon an unbalanced or deficient diet. Practically all of the children with athrepsia coming under his observation have been fed either on proprietary foods or some modification of cow's milk, or a combination of the two. A considerable number have been fed on either buttermilk or on lactic-acid fat-free milk over a long period of time. A relationship unquestionably exists between this disease and other nutritional disturbances which are believed to have their origin in a deficient diet. Certain manifestations are common to them all. Beading of the ribs occurs in scurvy as well as in rickets and is not unusual in pellagra and athrepsia. Swollen and tender gums are frequently observed in pellagra and acrodynia, athrepsia and rickets, and in all may be relieved by substances containing an antiscorbutic vitamine. In athrepsia there is atrophy of the blood as well as of the rest of the body. There is both a diminished volume flow and a decrease in the volume of the blood. Intravenous injections of glucose into the superior longitudinal sinus, transfusions of blood and intraperitoneal injections of Ringer's solution may be advisable. The author also suggests the addition to the lactic acid milk formula of rice gruel to which has been added the inner cuticle of the rice. He believes that this portion of the rice contains the most potent antineuritic vitamine. Soon after the commencement of treatment a vegetable puree is added as a separate feeding. It increases appetite and contains a variety of salts and water soluble vitamine. Weston has tried this method in a series of cases with good results.

Administration of Bile Salts in Infantile Marasmus. E. F. Kerby[5] reports his observations at the Evelina Hospital in 1918 on four marantic infants and comes to the conclusion that his second and fourth cases can not

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(4) Southern Med. Jour., March, 1921.
(5) Lancet, Feb. 5, 1921.

be shown to have derived any benefit from bile salts. In the second case, the child was syphilitic and was too much handicapped by infective enteritis to recover with any form of treatment. The first and third cases improved under bile salt treatment. The children showed no improvement during the first ten weeks in the hospital and appeared to be in poor condition. The steady general improvement synchronous with the bile-salt treatment impressed all clinical observers. The infants, apathetic and feeble, and to all appearances moribund, responded from the very outset of treatment until they became vigorous and thriving like normal babies. The actual gain was greater and more complex than a mere increase in weight.

Weight and Height in Relation to Malnutrition. W. R. P. Emerson and F. A. Manny[6] conclude that malnutrition is a definite clinical entity with characteristic history, definite symptoms and pathologic physical signs. Clinical evidence shows that the physical sign which may best serve to identify this group of malnourished children is the relationship existing between weight and height. The age factor is of secondary importance and is mainly serviceable in selecting cases stunted by constitutional disabilities such as syphilis, tuberculosis, deficient thyroid, the effect of certain drugs, convalescence from long illnesses, etc.

The tables derived from the studies of Boas and Burk represent the most extensive records of weight and height measurements made. Recent studies show that they are essentially true averages of unselected groups of American children. The Boas-Burk and other tables in general use are vitiated by the fact that they include a large number of malnourished children whose measurements lower the averages of weight and height, thus making them of relative value only as standards. As a working basis it has been found necessary to set forward the Boas-Burk figures half a year.

Individual variation in the relationship of weight to height is of sufficient importance to make it necessary to use a zone system rather than any single line as a basis of reference. After various experiments at deter-

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(6) Archiv. Pediat., August, 1920.

mining zone boundaries, clinical evidence is best satisfied by lines lying between 7 per cent. below and 20 per cent. above the "set forward" Boas-Burk figures. Outside of this central zone are found, on the one hand, the malnourished, and, on the other, the obese. Within the zone are still a considerable number of malnourished children requiring individual diagnosis. The malnourished children selected by this rule of habitual 7 per cent. under-weight for height form, almost without variation, 20 to 40 per cent. of any group of children in school and pre-school periods. When tables have been constructed from a sufficient number of children proved to be normal, the line of average weights and heights will lie somewhere between the "set forward" Boas-Burk figures and those represented by a line drawn midway between the 7 per cent. under-weight and 20 per cent. over-weight boundaries of the zone described above. Special studies of somewhat more carefully selected children, for example, those made by Baldwin and Robertson, confirm this statement.

Nature of the Reducing Substance in the Urine of Infants with Nutritional Disorders. O. M. Schloss[7] studied eighty-two patients, from whom 196 specimens of urine were examined. All the patients were affected with severe nutritional disturbances, characterized by diarrhea, refusal of food, vomiting, or loss of weight. The greater number of patients showed toxic symptoms. The urine of sixty-three infants reduced Benedict's qualitative reagent. The amount of the reducing substance calculated as glucose varied from 0.12 to 2.1 per cent. As a rule, glycosuria occurs only during the period of acute illness, and the patient either succumbs or improves within a few days. The duration of glycosuria varies but in most cases it covers a period of from one to four days. Fermentation by yeast always caused diminution or entire disappearance of the reducing substance indicating that it was not lactose. There was visible gas production in only nine cases. Alimentary lactosuria may occur, but probably only in infants who are not thriving and who are ingesting considerable lactose. Infants with severe nutritional disorders usually

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(7) Amer. Jour. Dis. Child., March, 1921.

secrete much less urine than normal; consequently it is concentrated. The question arises whether the reduction of copper solutions by the urines of these patients actually represents an increased sugar output. Since normal urine always contains reducing sugar, it seems possible that with diminished urine secretion the concentration of sugar may be sufficient to reduce copper solutions without there being an actual increase in the amount of sugar eliminated. There seems little question that the increased concentration of the urine may be a factor in the frequency with which such urines reduce copper test solutions. If this were the only factor concerned, there might be only an increase in the percentage of urine sugar but no true glycuresis.

Blood sugar determinations were made in sixteen cases; in all but two there was distinct hyperglycemia, indicating a disturbance in the metabolism of sugar rather than the presence of a purely renal glycuresis.

Study of the Blood and Its Circulation in Normal Infants and in Infants Suffering from Chronic Nutritional Disturbances. Kirsten Utheim[8] finds that the serum protein in normal infants is from 6 to 6.5 per cent. and remains at this level until the tenth or eleventh month, when the protein begins to rise, and by the fifteenth month it has reached the same level as found in adults, that is, about 8 per cent.

Infants suffering from various diseases show, with the exception of exudative diathesis and nephritis, no remarkable change in blood protein concentration, while infants with acute diarrhea or vomiting have a high percentage of protein, the result of blood concentration.

Premature infants and athreptic infants show a low protein percentage in blood, in many cases as low as 4 per cent. This condition in premature infants is an expression of the influences of age and development on the water metabolism of the organism (Benzold). So far as the athreptic infants are concerned, the low protein in some cases seems to be due to lack of power on the part of the organism to build up protein, in other instances to the over-feeding with carbohydrates.

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(8) Amer. Jour. Dis. Child., November, 1920.

The high water content of the organism in both premature and athreptic infants must be regarded as an important factor in the low immunity they show, thus predisposing these infants to multiple infections.

Besides this high water content of the organism, the athreptic infants show a very low rate of blood flow which in some instances is due partly to the diminished blood volume, in other instances to constriction of the peripheral small vessels in order to accomplish the distribution of the blood to the internal organs. This constriction of the peripheral vessels is proved by the differences found in the blood count and hemoglobin content between capillary and venous blood. The low blood flow is not usually accompanied by a lowering of blood-pressure because of the following compensatory factors: (1) a diminution of the blood bed by atrophy of the skin, subcutaneous tissue and musculature; (2) the contraction of the small peripheral vessels; (3) possible changes in the alimentary blood-vessels (Schiff).

This low rate of blood flow will contribute in lessening the resistance of these infants by depriving the body tissue of the necessary food and in this way contributes to the breakdown of the body cells.

Experiments on rabbits have shown that during complete starvation with deprivation of fluid, the blood volume falls below the normal value for the body surface as a result of water loss from the blood. However, by giving only enough food and water to prevent further weight loss the blood volume is rapidly restored and quickly reaches a value above normal for the body surface. Four rabbits did not completely regain the normal volume. These were rabbits which did badly and would not gain even when food was given in abundant amount. It is only fair to place the poor condition of these four animals in relation to the low blood volume. When we apply these findings to infants we can see that in athreptic infants who show a lowering of blood volume all the above-mentioned factors will still further affect the organism and all factors will work together in lowering the oxidizing power of the body cells and favor a breaking down of body tissues.

Certain Aspects of Protein Hypersensitiveness in Children. Six cases of protein sensitization beginning in small children are reported by K. D. Blackfan.[9] The proteins causing symptoms were cow's milk, eggs, nuts, in one case cereals. In a large percentage of cases the hypersensitive state is present at birth. Probably sensitization is inherited in those patients who exhibit manifestations when they are brought in contact with the protein for the first time. There are numerous cases recorded in which the sensitization has been transmitted through several generations. In a general way it follows the principles of the Mendelian law of heredity.

The treatment of protein hypersensitization may be carried out by omitting the protein from the diet or by the process of desensitization. In certain cases, a combination of these methods may be used. Omitting certain proteins from the diet may cause considerable difficulty, and even harm, as in withdrawing milk from a child with eczema. Small quantities of a food are sometimes eaten without symptoms, and subjecting it to high temperature may render the active properties of certain proteins inactive. In the desensitization method the author has come to rely on administering the protein by mouth. Meats, milk and cereals may be given in small amounts in solution. The protein of egg is best given in capsules. The initial dose is that which fails to give a positive skin reaction. The aim should be not only to have the patient able to ingest the protein without a systemic reaction but to secure a negative skin reaction. Proteins must be given regularly even after the patient has become able to take them by mouth in quantity, as there is always the possibility of a return of the symptoms if this is not done.

Acrodynia. Eight cases described to W. Weston[1] by Dr. Patrick (in a letter) are the basis of this report. They occurred in children between the ages of 9 months and 2 years. The disease began with loss of appetite, malaise bronchial catarrh or intestinal disturbance. The reflexes were diminished, the patellar being frequently absent. Hyperhydrosis, pruritis and maceration of the

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(9) Amer. Jour. Med. Sci., September, 1920.
(1) Archiv. Pediat., September, 1920.

skin were frequently present. The fingertips and toes were always cold, cyanotic, swollen and tender. Photophobia, ulceration of the gums and salivation were present at times. A diet rich in vegetables usually produced cure. Lack of vitamines is probably a factor in this disease.

H. J. Cartin[2] reports five cases of acrodynia presenting symptoms of varying severity, all having an eruption, papular and at times macular; photophobia; paresthesia and irritability; burrowing of the head; chewing of fingers and hands; profuse nasal discharge; apathy; lack of appetite; leukocytosis; pigmented spots; scanty urine. The five children came from different localities. Because of their lack of desire to eat, the author endeavored to force the feeding but did not resort to gavage. For the itching he tried various ointments, hot baths and hot applications. For the pains, he used codeine phosphate. No treatment appeared to be of any benefit. None of the patients died but all had a slow convalescence.

GASTRO-INTESTINAL DISEASES

Bacteriology of the Stomach and Duodenum in Healthy and Sick Infants. K. Scheer[3] finds that in the healthy infant there are no bacteria in the stomach and duodenum with the possible exception of streptococci. In infants with gastro-intestinal disturbance, the bacterial content of the stomach depends to a large degree on the acidity of the gastric content. If there is a hydrogen ion concentration of $[H^\cdot] = 20 - 60 : 10^{-5}$ or more, the gastric contents are sterile, even when bacteria are abundantly present in the duodenum.

Congenital Malformations of the Esophagus, with Report of Two Cases. R. P. Reynolds and W. W. Morrison[4] review the literature and report two cases from Bellevue Hospital. In the first case gastrostomy was performed, death ensued three hours later, apparently from hemorrhage. At autopsy it was found that the esophagus below the level of the fourth vertebra was

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(2) Penn. Med. Jour., February, 1921.
(3) Jahrb. f. Kinderhlk., 1920, vol. 92.
(4) Amer. Jour. Dis. Child., April, 1921.

represented as a fibrous band to within one inch of the stomach.

The second case concerned a child with a malformation of the right forearm due to failure of development of the lower two-thirds of the radius. There was a congenital obliteration of the esophagus at the level of the second dorsal vertebra. Gastrostomy was performed, following which the child lived for twenty-eight hours.

Congenital Atresia of the Esophagus. Congenital anomalies of the upper digestive tract are not so infrequent as is generally supposed. There are now reported 150 cases not including about twenty-eight which could not be confirmed. H. L. K. Shaw[5] reports a case which is typical of the majority of these malformations. He saw the child two days after birth. It was observed when the baby was placed on the breast that the milk returned through the nose together with thick mucus stained with dark brown material. The passage of a catheter met with obstruction and roentgenogram showed that the esophagus ended in a cul-de-sac. Operation was not advised. Postmortem examination showed the esophagus to present a somewhat thickened wall and ending abruptly in a blind pouch. The lower portion of the esophagus appeared normal and opened directly into the trachea at the bifurcation, the walls of the esophagus blending imperceptibly with those of the trachea. The left lung consisted of three lobes, no other abnormalities were present.

Esophageal malformations are classified by Ballantyne as follows:

1. Complete absence of the esophagus, its place being taken by a muscular band stretching from the pharynx to the cardiac end of the stomach.
2. Termination of the esophagus in a simple cul-de-sac.
3. Termination of the esophagus is a cul-de-sac, the lower rudiment of the canal communicating with the trachea or bronchi.
4. Tracheo-esophageal fistula, the esophagus being otherwise normal.
5. Membranous obstruction of the esophagus.

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(5) Amer. Jour. Dis. Child., December, 1920.

6. Presence of esophageal diverticula.
7. Duplicity of the esophagus.

The case reported comes under the third type, which comprises more than 75 per cent. of all reported cases. Treatment is unsatisfactory. No such patient has recovered or been benefited in the slightest way by either surgical or medical treatment.

Infectious Gastro-Intestinal Diseases. B. Grünfelder[6] asserts that the most important cause of parenteral diarrhea is grippe. Respiratory symptoms may be absent. In the etiology toxic effect on the digestive organs or secondary alimentary disturbances, also secondary infection must be considered. A primary intestinal infection is present only in dysentery. Paratyphoid may run a clinically similar course. Differentiation must be made bacteriologically. There are two forms of paratyphoid: acute gastro-enteritis paratyphosa and paratyphus abdominalis. Typhoid is much rarer and except during the first two years of life it is more benign in childhood than in the adult. The treatment with polyvalent colon serum is more favorable in typhoid than in dysentery. The dietetic therapy aims to avoid inanition and thereby secondary alimentary complications.

Giardia (Lamblia) Intestinalis. A Common Protozoan Parasite of Children. K. F. Maxcy[7] concludes that *Giardia intestinalis* is present in the intestinal tract of a large percentage of apparently normal children. It is rarely found before the first year. The percentage of infestations appears to be much higher in childhood than in adult life. The finding of a large number of motile giardia in a diarrheal or dysenteric stool is not sufficient evidence to establish the etiologic relationship of this parasite. In certain rare instances the parasite may be responsible for some intestinal disturbance, although this point has not yet been firmly established.

[It would undoubtedly be an addition to our knowledge if the intestinal protozoa commonly occurring in infants and children were more critically studied.—Ed.]

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(6) Monatschr. f. Kinderheilk., 1920, vol. 19, No. 3.
(7) Bull. Johns Hopkins Hosp., May, 1921.

A Method of Obtaining Direct Cultures from Intestinal Ulcers in Infants and Young Children. R. C. Spence and S. McLean[8] have found a modified Yeoman proctoscope, 8 inches long and ½ inch in diameter, satisfactory for obtaining direct cultures from intestinal ulcers in infants and young children with dysentery. With the proctoscope is used a sterile glass tube 12 inches long and ¼ inch in diameter. In this tube there is placed a stiff wire 2 inches longer than the tube, on the distal end of which there is a small cotton swab (Fig. 1).

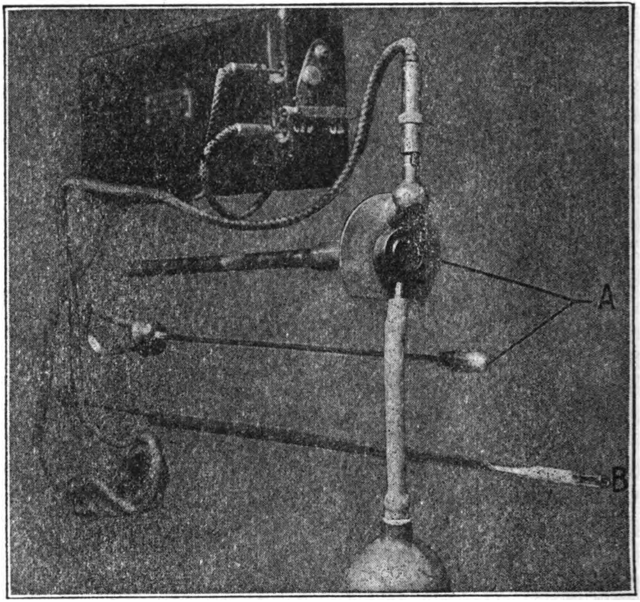

Fig. 1.—Complete outfit: *A*, proctoscope; *B*, glass tube, containing swab.

The proctoscope is introduced (Fig. 2) and the ulcer located. The distal end of the glass tube is placed over the ulcer, and the cotton swab is then withdrawn into

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(8) Jour. Amer. Med. Ass'n., Sept. 11, 1920.

the glass container in order to prevent contamination, and the tube containing the swab withdrawn. Melted agar is inoculated from the cotton swab and poured into Petri dishes.

Even young infants show little or no signs of discomfort during a proctoscopic examination. It is a relatively simple procedure to secure a culture directly from an intestinal ulcer by this method.

Proctoscopic examination is of great value in differentiating ulcerative from nonulcerative types of colitis.

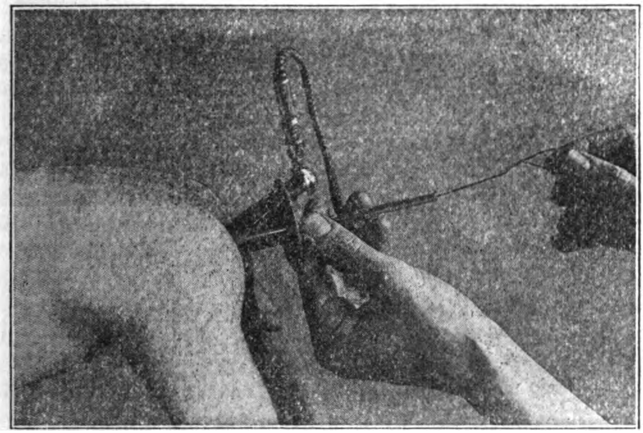

Fig. 2.—Posture of child during examination.

It has been found at the Babies' Hospital that an earlier bacteriologic diagnosis can be made by direct culture from the lesions than by the customary stool cultures. Data are being obtained relating to various phases of bacillary dysentery which will be published some time in the future.

Use of Thick Cereal Treatment in Habitual Vomiting. Habitual vomiting of infants, usually subsides, says B. Epstein,[1] toward the end of the first year, at the time when solid food is given. This fact he correlates with the occurrence of the peristaltic function of the stomach,

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(1) Jahrb. f. Kinderhlk., 1920, vol. 93, No. 6.

which in turn is influenced by the change in consistency of the food. According to Stiller, the peristaltic function of the stomach is its ability to contract concentrically around its contents and to adapt itself to the volume of the contents. The faulty surrounding of the stomach contents by the gastric wall when peristalsis is absent, allows the swallowing and retention of air which favors vomiting. According to Epstein's observations, it is possible to influence habitual vomiting favorably by giving a few teaspoonfuls of a very concentrated cereal immediately before the taking of food. This treatment is especially valuable in breast-fed children since it makes weaning unnecessary. A further advantage is its simplicity. The author also emphasizes the fact that the deficient peristaltic function of the stomach is not the only cause of habitual vomiting in infants.

Case of Failure to Gain: Rumination. C. G. Kerley and E. J. Lorenze[2] report a case of an athreptic bottle-fed baby of five months, with a neuropathic family history, who regurgitated a considerable portion of each feeding, and failed to gain in weight. On examination the child was found to be a ruminator. A mask was devised to prevent the child from moving her lower jaw and this procedure was followed by marked gain in weight.

Treatment for Colic in Breast-fed Infants. Preliminary to any statement concerning the treatment of colic, F. Grulee[3] says, one must always bear in mind that, in the majority of cases, colic is a condition due not only to too much fat but usually to too great a quantity of breast milk. One can reduce the quantity of breast milk, by shortening the length of the nursing period. This disproportionately reduces the quantity of fat in the food since, toward the end of the nursing period, the fat is several times as great relatively as in the early portion; but it is well known that many cases of colic do not respond to these simple methods, and one is frequently at one's wits end to devise other ways of combating the difficulty. A treatment which has been repeatedly tried out and which has proved successful, not

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(2) Archiv. Pediat., May, 1921.
(3) Jour. Amer. Med. Ass'n., Dec. 18, 1920.

only in the author's own practice, but in that of his colleagues, is as follows:

Morning and evening these children are given about 5 c.c. of liquid culture of active lactic acid bacilli, and each breast feeding is preceded with 1 gram of powdered casein. There is no difficulty in administering the liquid culture of the lactic acid bacilli; but powdered casein is hard to use. It is quite difficult to get pure casein on the market. There are proprietary combinations of casein which can be used, and it is possible to obtain pure casein if sufficient search is made. The ordinary casein of commerce is not to be used.

Even though the powdered casein is obtained, it is not soluble by ordinary means, and hence it is necessary to make a paste and place this on the back of the infant's tongue. If it is impossible to obtain the powdered casein, one may carefully skim milk and take the curd of the milk. The quantity of curd to be used before each nursing is approximately that obtained from an ounce of skimmed milk.

One advantage of this treatment is that ready coöperation of the mother is usually obtained when she learns that the treatment consists in giving the child some extra food. One should not expect that treatment of this sort will bring results at once; but it is not usual for a case of colic to resist this treatment for longer than a week or ten days, and usually the benefit begins to appear within from twenty-four to forty-eight hours.

Another type of colic which is rather frequently encountered is that due to a deficient quantity of breast milk. If the infant has colic under these circumstances, the best food for supplementing it will undoubtedly prove to be albumin milk.

A Method for the Prevention of Colic in the Nursing Infant. During the past five years Current[4] has worked out and followed a method which, after constant application in cases of colic of varied severity, has proved very successful in preventing the colicky attacks. Knowing that colic is caused by decomposition of food in the bowel, it was conceived that by administering a food vehicle which would be antagonistic to a decomposing intestinal

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(4) Northwest Med., October, 1920.

medium and which would render an intestinal digestive flora less liable to decomposing changes this trouble could be prevented in the greater number of instances. The method consists in the giving of from one-half to one ounce of from 3 to 4.5 per cent. of a warm cereal gruel immediately before each nursing, except the night nursing and before every nursing if necessary. The results obtained have been excellent. This technique has been used in all cases of colic, and requires no alterations, except the amount of the starch mixture required for the individual infant, and the strength of the starch mixture according to the digestive ability and tolerance of that infant for a starch food. Very few infants of any age have any perceptible difficulty in digesting 3 per cent. starch mixture. The reports of Sauer and of Porter on the starch feeding of infants are sufficiently convincing. There is no doubt that starch as a food is better borne and better tolerated by the infant than we have been led to believe. By administering cereal gruel in cases of colic the decomposing culture field is removed and a less favorable culture medium is established for the development of the intestinal bacteria.

That the diastatic and amylolytic ferments are present in the digestive tract of the greater percentage of infants of all ages has been proved by Moro, Hess, and others. Starch is, no doubt, well tolerated during infancy and there are no by-products formed to produce an intestinal toxemia. Oatmeal gruel, wheat gruel, and barley gruel are the different cereal gruels used. Oatmeal gruel is indicated when there is inactivity of the bowel, as it favors the formation of the volatile fatty acids, and for this reason gives a decidedly laxative action. Wheat gruel has very little effect upon peristalsis. Barley gruel has a quieting effect upon the peristaltic action and is indicated in cases in which the bowel is over-active.

Etiology of Infantile Diarrhea. The first section of C. E. Bloch's[5] work is an attempt to clear the ground with regard to the etiology of infantile diarrhea. In his discussion of Czerny's and Finkelstein's theories, which place bacteriologic activity more or less in the background, and which trace all the symptoms of infantile

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(5) Ugesk. f. Laeger., 1920, vol. 82.

diarrhea to the chemical action of the food and its decomposition products, the author remarks that these theories have involved their sponsors in a tangle of contradictions from which many authorities are straying back to the simpler theory of infection. Bloch qualifies his adherence to this teaching with the reservation that no irrefutable evidence has yet been produced, proving that infantile diarrhea is due to infection.

Of the assumption that this diarrhea is due to infection, Bloch raises the further question: Is it possible clinically to distinguish between various cases of infantile diarrhea according to their bacteriologic etiology in the same way that the diarrheas of typhoid, paratyphoid, dysentery and paradysentery can be clinically distinguished?

Bloch's material includes all the cases of acute gastro-intestinal disease in infancy observed at the Rigshospital in the period 1911-18 inclusive. The classification adopted was clinical. (1) Acute dyspepsia, with eighty-five cases and no deaths; (2) acute gastro-enteritis, 310 cases with a mortality of 24 per cent.; (3) acute gastro-enteritis, complicated by chronic dyspepsia or infantile atrophy, seventy-seven cases, with a mortality of 30 per cent.; (4) symptomatic diarrhea, *i. e.*, cases (figures not given) in which the diarrhea was merely an incident of a disease outside the digestive system.

In 461 of all these cases, bacteriologic examinations of the feces were made. In twenty-one or about 10 per cent. of all the cases of acute gastro-enteritis examined bacteriologically, paradysentery bacteria were found; these cases were scattered over several years and did not represent a single epidemic. In one case typhoid bacilli, and in five cases paratyphoid bacilli were found; but these, too, were isolated cases, not the result of a single outbreak. The clinical manifestations of twenty-one cases of paradysentery varied greatly; some were severe and some were exceedingly mild. In fourteen out of eighteen cases of acute paradysenteric gastro-enteritis, blood was demonstrable in the motions, but there were many other cases of hemorrhagic motions in which paradysentery could be excluded. The clinical course of the six typhoid or paratyphoid cases was more uniform. In every case the onset of the disease was sudden, and the diarrhea and vomiting were accompanied by slight fever. Apart from the bacteriologic evidence in these cases, there was no sign of typhoid fever, such as a roseola or enlargement of the spleen. The clinical picture was that of mild, non-specific gastro-enteritis. The *B. proteus* was found in fifty-two out of 128 cases of acute gastro-enteritis and in ninety-five out of 244 cases of acute dyspepsia and symptomatic diarrhea. Bloch concludes that the clinical picture, epidemiology, and the pathologic-anatomic findings in infantile diarrhea are the same whether or not pathogenic bacteria are found in feces. Acute gastro-enteritis in infancy is due to infection, but not to any specific infection. In most cases coliform bacilli, not pathogenic to adults or children over a certain age, are probably the cause of this disease. In a minority of cases the disease is due to microörganisms pathogenic to adults.

[In this conception Bloch at the present time stands quite alone. The extensive bacteriologic researches of Escherich, LeSage, Booker and a host of others do not offer conclusive proof as to the exclusive bacteriologic origin of the largest group of nutritional and digestive disturbances in infancy. The consensus of opinion favors the view that bacteria may play a part though their action is secondary, not primary. It seems well established that a large group of digestive disorders in infancy is due to food disturbances; though on the other hand it can not be denied that definite primary infections of the intestine may be produced by the typhoid group, the dysentery group as well as by other pathogenic organisms.—ED.]

A Clinical Classification of the Diarrheas of Infancy and Childhood. L. T. Royster[6] classifies the diarrheas of early life as follows:

(A) Nervous diarrhea:
  1. Sudden overheating.
  2. Sudden chilling.
  3. Excitement or fear.
  4. Improper or indigestible food.

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[6] Archiv. Pediat., September, 1920.

(B) Food Injury (acute):
  1. Overloading the digestive tract, particularly the stomach, with proper food.
  2. The accidental administration of an excess of one or more food elements in a bottle baby's formula (fat, carbohydrate or proteid).

(C) Food Injury (chronic):
  1. The habitual administration of too large quantities of one of the normal and proper food elements.
  2. Mixtures too strong in all elements.

(D) Fermental Diarrhea:

(E) Infectious Diarrhea due to:
  1. The dysentery group of organisms.
  2. The gas bacillus.
  3. Other organisms. Clinically, group E may be divided into four types.

Summer Diarrhea. C. V. Rice[8] states that summer diarrhea may be caused by improper food or by bacteria, the chief types of which are dysentery bacillus, gas bacillus, or streptococcus, colon bacillus and *Bacillus pyocyaneus*. The prognosis of the infectious type should be considered very serious from the start, and death should be expected in the majority of cases. Differential diagnosis between food intoxication and the bacterial type is made by a starving period of 12 to 24 hours, with plenty of fluids. In food intoxication the temperature becomes normal. With the infectious diarrhea, there is no change in the temperature following the starving period. In the differential diagnosis of the various types of organisms, the *Bacillus pyocyaneus* causes a peculiar green color of the stool. If streptococci are the exciting cause they can be found in large numbers by the microscope. The dysentery bacillus is diagnosed by the exclusion of other organisms.

The success of treatment depends upon the type of organism involved. The dysentery and colon bacillus and the streptococcus, classified as facultative bacteria, thrive on either carbohydrates or proteins but produce harmless products from carbohydrates and toxic products from protein. Therefore, in this type carbohydrates should be the important diet. The use of drugs is symptomatic.

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(8) Jour. Okla. State Med. Ass'n., August, 1920.

The more prominent forms of diarrhea are due to improper diet. The ideal diet for this type, Rice thinks, is high protein, low whey and non-fermentable carbohydrates.

The Prophylaxis of Ileocolitis. J. R. Snyder[9] states that prophylaxis consists in keeping every child's resistance above or as near normal as possible and in feeding the child nothing but clean, well-adapted food. The explanation for the greater prevalence of colitis among children between 12 and 24 months of age, lies, not so much in the fact that children of the former age have been weaned and are cutting difficult teeth, as in the fact that these children are crawling and walking. The older child on foot or on hands and knees, makes excursions of exploration during which he comes in contact with many germ-laden objects.

A play pen, or dimensions to limit the amount of floor space over which the baby may crawl but to encompass an area sufficient to permit exercise, is a good prophylactic device. The floor of the pen should be covered with a detachable piece of oil cloth, linoleum or sheeting. Only toys with smooth, easily washable surfaces should be allowed in the pen. Clothing is an important consideration. The baby's face and hands should be kept clean.

The author is convinced that for artificially-fed babies it is safer to use, during the summer, dry milk than pasteurized fresh milk. He has never seen a case of rickets or scurvy traceable to the use of dry milk. With the very first indication of bowel trouble in summer, the child should be treated actively. A dose of castor oil should be given at once and food should be stopped until it can be determined how serious is to be the disturbance. The possibilities of food contamination and the source thereof should be investigated. The food formula should be readjusted to suit the indications. If there is evidence of an inflamed condition of the bowels, a bowel irrigation should be given after the oil acts. One or more gallons of saline, as hot as the infant can stand with comfort, should be used.

The author believes that acute colitis should be made

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(9) Archiv. Pediat., September, 1920.

a reportable disease. Bowel discharges from a colitis case are as dangerous as those from a typhoid fever case.

Case of Intestinal Intoxication (Herter's Intestinal Infantilism). S. Z. Orgel[1] reports the case of a female child, 1 year old, who was brought for advice because of her smallness of size and constipation. She was a premature infant, born at seven months, breast-fed for four months. At the end of the eighth month she weighed 8 pounds and was about the same height as at the age of one year. The child had been having two to three bowel movements a day of slate color, voluminous and pasty and very large. Every third to fourth day the child became constipated. These attacks of constipation were associated with abdominal distention and large amounts of gas by rectum. The stools were very offensive in odor.

On physical examination, the child was found to be small, 25½ inches tall, weight 12 pounds, 5 ounces. She was well-nourished and intelligent. The eyes were slant and no teeth had erupted. There were no external signs of rickets. This was undoubtedly a case of dwarfism, either pancreatic infantilism or Stills or Herter's intestinal infantilism. The author discusses briefly all types of dwarfism.

The treatment of this case consisted in a general diet of milk, cereals, farinaceous foods with egg, zwieback, potato and broth and the juices of stewed fruits. An emulsion of cod liver oil and phosphorus, and thyroid phosphoid were given. Under this treatment the child began to gain in weight at the rate of about 5 ounces a week. The growth in height was less noticeable. The stools became normal and the periods of constipation disappeared. At the end of the fifth week the teeth began to erupt. After stopping the thyroid extract at the end of one month the child increased markedly in weight.

Toxic Symptoms in Infants and Children with Gastro-Intestinal Manifestations. A study of the clinical symptoms and the blood findings in 23 cases was made by H. Schwarz and J. L. Kohn.[2] They made examinations of

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(1) Med. Record., Feb. 12, 1921.
(2) Amer. Jour. Dis. Child., May, 1921.

the urea, non-protein nitrogen, uric acid, creatinin, carbon dioxide, sugar and cholesterol. They reached the conclusion that these cases seem to occur almost wholly in the summer months and are very rare in entirely breast-fed children. These cases are always accompanied by vomiting and diarrhea. The etiologic factor or factors are as yet unexplained. The carbon-dioxide content and the nitrogenous constituents of the blood may be normal. Some of these cases may show only diminished carbon-dioxide content. Others show a normal carbon-dioxide content, but a markedly increased retention of the nitrogenous constituents, and, finally, some cases show both a diminished carbon-dioxide content and a nitrogenous retention. Therefore, their studies would indicate that acidosis based on a lowered carbon-dioxide content of the blood is not a constant or uniform finding.

The sugar and cholesterol content of the blood may be normal or high. There is apparently no relation between these constituents and either the nitrogenous or the carbon-dioxide content. In spite of all the variations in the chemical composition of the blood, there is no difference in the clinical picture or in the history of these cases.

Critical Review of the Treatment of Acute Gastro-Enteritis in Early Infancy. S. C. Gutiérrez[3] finds that most classifications of the gastroenteritides make the mistake of assuming a certain definite cause, while as a matter of fact both diet and infection are usually causative. The same is true of symptomatology: the different diseases only represent various degrees. Treatment should always be dietary and medicinal. The principle of treatment must be not to overstep the limit of alimentary capacity of the intestinal tract. Therefore, the kind of food is not so important as the fact that it is within the infant's tolerance. The failures of Finkelstein's albumin milk he believes to be due to the excessive extension of its indication, its success to the adaption to digestive capacity, rather than to the addition of albumin and dilution of the whey. The same is true of Jäger's buttermilk.

Medicinally, water takes the first place, best in the

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(3) Pediatr. espan., 1920, vol. 9, Nos. 98-99.

form of physiologic salt solution. The flour gruels of Moro and others act only through their water content. The author had as good results with ordinary milk, undiluted or diluted with rice water or warm water, as are reported of other mixtures in which some component has been reduced. He recommends cathartics only in exceptional cases but recommends the use of gastric and intestinal lavage. He advises care in the use of astringents and recommends opium after the disappearance of toxic symptoms.

Pyloric Stenosis in Infants. Every case of persistent vomiting occurring in a young infant, says Smith,[4] should be carefully investigated with the possibility of stenosis of the pylorus in mind.

In milder cases, the possibility of spasmodic obstruction should be considered, and the relation of the vomiting to any existing nervous diathesis should be investigated. As in adults, gastro-intestinal symptoms may have an origin outside the abdominal cavity. In this connection the unstable equilibrium of the infant's nervous organization should not be lost sight of.

Improper food is not the only cause of vomiting. Sometimes the receptacle is deranged physiologically, mechanically, or both.

Changes in an infant's food, especially if from mother's milk, should be made only for sufficient cause, with a rational idea of what is to be accomplished, and with an adequate appreciation of the responsibility undertaken.

No child should be allowed to die of starvation on account of pyloric stenosis. An operative death, even, indicates that an attempt was made to relieve the condition.

Differential Diagnosis of Congenital Pyloric Stenosis in Infancy. This paper is essentially a differential diagnostic consideration of congenital pyloric stenosis, called spastic pyloric hypertrophy by K. Faber,[5] and considered to be functional, from organic stenosis. The organic changes may be of very different nature. He describes two cases belonging to the latter group. This

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(4) Northwest Med., October, 1920.
(5) Jahrb. f. Kinderhlk., 1920, vol. 93, No. 3.

group is characterized by stenotic symptoms after the second three months and beginning of vomiting during the first few days of life. The Roentgen picture is also of great significance in the differential diagnosis.

Case of Antenatal Intestinal Obstruction (with Some Remarks on Other Forms of Intestinal Obstruction in Infants). The case of a full term normally born child who was found to have marked abdominal distention at birth is reported by S. A. Owen and N. Lake.[6] Hydramnios of 5 pints was observed and vomiting of greenish fluid and the passing of a plug of mucus from the bowels were observed. Physical examination on the following day revealed a markedly distended abdomen, with conspicuous superficial veins, visible peristalsis and palpable distended coils of intestine.

On rectal examination, the intestine appeared to end blindly at the limit of reach of the little finger. Exploratory laparotomy was performed and showed the obstruction to be one foot above the ileocecal valve and due to a band arising from the mesentery and descending to the upper surface of the bladder, where it appeared to blend with the urachus and so passed up to the umbilicus. It was undoubtedly the remains of the vitelline artery of the embryonic circulation coming as a branch from the superior mesenteric. The portion of the bowel underlying this band was gangrenous. The child died on the following morning.

The authors review the literature relating to anatomic, congenital and pathologic defects of the intestine and summarize five of their own cases illustrating the difficulties encountered in the diagnosis of intestinal obstruction. The first case was one of severe toxemia of unknown origin simulating duodenal obstruction, in an infant of 5 months. Laparotomy was performed and followed by death. The second case was one of persistent vomiting in a male infant, aged 10 weeks; postmortem revealed a peritoneal band which occluded the duodenum near its lower end. The third case was one of partial volvulus of the small intestine in an infant of 5 weeks. The fourth case was one of intestinal obstruction in a male infant 5 weeks old, due to a large hemorrhage into

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(6) Brit. Jour. Child. Dis., July-September, 1920.

the wall of the gut with streptococcus peritonitis. Laparotomy was performed and death ensued. The fifth was a case of torsion of the left ovarian pedicle in a femoral hernia in an infant of 6 months. Operation was performed and the patient recovered.

Intussusception in Children. A. W. Abbott[7] analyzes ten cases and comes to the conclusions that in the child intussusception is ileocecal in 90 per cent. or more; in the adult it occurs in this location in only about 25 per cent. In the child, no satisfactory explanation of the cause has been demonstrated. The onset is abrupt with marked periodicity in the pains. In the adult, some evidence of preceding intestinal disease is to be obtained in the majority of cases. Seventy-five per cent. of the cases occur in children under one year of age. In 20 per cent. this pain is followed by collapse, and nearly 100 per cent. of these patients have died whether operated on or not.

A tumor can be felt in 90 per cent. after three hours. It can be felt oftenest in the left abdomen, occasionally in the region of the transverse colon, seldom in the ileocecal.

The shadow of the thick oblong mass has been seen with the fluoroscope in all of the cases the author has examined.

Of the later symptoms, vomiting is absent until after twenty-four hours in 81 per cent., if we exclude the emptying of stomach at the onset; 77 per cent. have no bloody stools, or not until after two days. Mucus stools, perhaps tinged with blood, are generally first noticed when first seen by the family physician and before the blood appears. It is an earlier symptom than bloody stool.

The intussusception can be felt by rectum in only a little more than one-half of the cases. Feces are not passed after the one or two evacuations immediately following the attack. In children so young it is usually impossible to say whether or not one finds a localized tenderness. In four of the author's cases this absence of tenderness could be definitely established.

Recurring pains, with periods of relief, Abbott regards

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(7) Journal-Lancet, May 15, 1921.

as the most conspicuous and unmistakable of symptoms. The outcries accompanying the pains are peculiar, and vary from a little cry or grunt to a subdued moan. The pains last from one-half to three minutes, rarely more than two, with a longer interval of relief.

In the second form, that of collapse, the child is often too weak to manifest signs of pain beyond occasional moaning. This symptom, sudden collapse, with indication of periodic pain, in a child previously normal, should strongly suggest the probability of an invagination of the intestine. Mucus stools often streaked with blood would be of the utmost diagnostic importance were it not for the fact that this symptom is almost equally as often seen in dysentery. The time when a tumor is first noticeable can seldom be determined. In the child of a physician, the tumor was made out in three hours after the initial pain. Considerable swelling of the intussusceptum undoubtedly occurs within three hours in most cases.

The next most common symptom, 83 per cent. in Abbott's cases, is the absence of fecal movements. The child may have one or two movements immediately following the attack, but after that the bowel is empty below the intussusceptum. A flaccid abdomen, generally scaphoid, was noted in 80 per cent. of his cases. It is noted early and may continue for days. Distention comes too late to be of diagnostic importance. Rejection of the stomach contents accompanied the onset in 100 per cent. of these cases, but vomiting was not resumed until after the second day in 81 per cent. When the intussusceptum can be positively identified by rectal touch, it is absolutely pathognomonic, but it could be reached by the finger in only 55 per cent. of his cases. The absence of this sign should not exclude intestinal invagination.

Chronic Intussusception in Children. G. F. Still[8] describes four cases in which the onset occurred respectively at 13 months, 14 months, 23 months, and 3½ years. A composite case from this experience is as follows:

On a particular day the child seemed to have pain in the abdomen and vomited once or twice. During

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(8) Archiv. Pediat., March, 1921.

the next few days there was occasional vomiting, generally in association with a colicky pain. The vomiting has become less frequent, only once in two or three days, and the pain is only occasional. The bowels which were before open daily, have since the onset been less regular, aperients have been necessary, but when given have worked well and the stools have been normal; there has been no blood in the stool or at most there has only been a streak once or twice, such as might be seen on the stool of any constipated child. The symptom which has troubled the parents most is the wasting; the child after three or four weeks of these vague troubles is obviously getting thin. The temperature throughout has been normal. Such is the history, and with a duration of some weeks even the finding of a more or less definite lump in the abdomen may hardly raise a suspicion of intussusception, especially when the mother's chief complaint is the wasting. Nevertheless, it is by the detection of the more or less sausage-shaped tumor and especially by its varying consistency from moment to moment during palpation that the diagnosis is to be made; to the *tactus eruditus* also the unnatural emptiness of the right iliac fossa (Dance's sign) may be useful confirmatory evidence as in the ordinary acute intussusception.

The entire absence of blood from the stools throughout, or the slight and transitory character of the bleeding when present are features of chronic intussusception, which might mislead.

Celiac Disease. A typical case of celiac disease is described by E. Cautley.[9] A boy was under his observation and investigation in hospital for six months. During the six months the child's general condition varied from time to time and he showed a certain amount of improvement. The conclusions derived from the pathologic reports were that the blood changes were secondary; the slight excess of urinary diastase was only suggestive of a mild degree of pancreatic insufficiency, not enough to account for the disease; the acid-content of the stools, the high organic acid, the high value for total fat and the relative ratio of unsplit to split fat were indicative

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(9) Archiv. Pediat., March, 1921.

of intestinal disturbance, and were similar to the changes usually found in celiac disease; the absence of urobilin indicated a lack of biliary secretion.

The chief characteristic of this disease is a persistent or relapsing looseness of the bowels, not always sufficient to be called diarrhea, usually one or two stools daily, with recurrent periods of three or four stools daily of the type already described and containing an excessive proportion of fat, in comparison with the amount taken in the food; occurring in an infant or young child with a large belly and a distinct retardation of growth and development, sometimes so marked as to deserve the name of "celiac infantilism."

Such a child is pale and apathetic; remarkably emaciated in prolonged cases, especially in the limbs, whereas the face may remain comparatively plump as in cases of intestinal dyspepsia and abdominal tuberculosis. In addition, there is considerable muscular weakness and general debility, at times so marked that the child can not walk or even stand without assistance. At intervals, under treatment, there is noted both improvement in strength and gain in weight. One of the most striking features of a prolonged case is the small size of the child, who appears from two to five years younger than his real age. The mental development is normal, except in so far as it is somewhat backward, from lack of education and mixing with other children, on account of the illness. Possibly the general malnutrition interferes a little with the normal, or full development of the intellectual faculties.

For months or years the patient's health remains more or less stationary, periods of improvement being followed by periods of relapse, until death ensues from asthenia or intercurrent disease. In favorable cases, the periods of improvement become of longer duration, while the relapses are shorter and less severe, until eventually steady improvement ends in recovery. It is not unusual for successful results to be ascribed to efficient dietetic treatment or some particular drug, but it is more probable that the cure depends on the gradual development of efficient digestive functions as the child gets older, provided that suitable dietetic and medical treatment is given in the meantime, for undoubtedly an injudicious diet is harmful and medical remedies are beneficial.

The affection is more frequent in private than in hospital practice. Still noted a much greater frequency in the female sex, thirty girls to eleven boys, although Cautley has not noted any marked preponderance of either sex. It is a disease of early life, beginning under five years and generally under two years of age. The exciting cause and mode of onset are variable and often ill-defined. No predisposing factor has been determined. It may start in the strong and healthy, though perhaps not so readily as in weak and delicate infants. In the early stages of this affection diagnosis is difficult, and often impossible. Tuberculous ulceration of the ileum and colon, and dysentery may lead to error in diagnosis. Ulcerative colitis or ileocolitis, generally a sequel of an infective ileocolitis, presents great difficulty if the stools are not thoroughly examined. The affection runs a slow and tedious course and lasts for months or years, producing marked lack of physical development. As a rule, it ends in recovery and the child gradually grows into a normal adult, but is apt to remain unduly small. It is said to be rarely fatal. Out of forty-one cases (Still) six patients died, and two of the deaths were due to accidental causes. Death is due to asthenia, following prolonged relapses; to secondary catarrhal inflammation of the gut; or to other complications. No positive evidence of value as to pathogenesis has been discovered in the body after death. At present Cautley thinks the affection must be regarded as a symptom-complex dependent on the failure of the biliary functions. The ascertained facts include a deficiency or absence of biliary secretion, intestinal derangement, and deficient absorption of foodstuffs, notably fats.

The conclusion arrived at is that the affection is due to a failure of fat assimilation or absorption of unknown causation or the result of hepatic inadequacy which causes a deficient secretion of bile, but no organic hepatic disease. In the treatment the diet must be reduced in quantity and altered in quality. Fat must be limited in amount and sometimes entirely excluded. The large globules of cow's milk seem particularly unsuitable, so recourse must be had to human or asses' milk, or a dried, malted or condensed milk. The fat in yolk of egg agrees well with some children; while others can often take small quantities of butter, bacon fat or beef dripping. Cream must be avoided entirely. Carbohydrates agree best in the form of malted or partly malted preparations. For protein food, good broths, and pounded-up fish, chicken or other white meat, mutton or beef are recommended.

Bile salts and bile have been given to remedy the deficiency and great expectations have been formed of their value, but they have not been fulfilled in Cautley's experience. Bismuth and soda, and aromatic chalk powder are useful for the looseness of the stools; and sulphocarbolates, phenol or salol for the offensive smell. Salicylates, ammonium chloride, tincture of podophyllin and brandy may be useful as hepatic stimulants; small doses of grey powder are often beneficial.

On the whole, treatment is still unsatisfactory and is likely to remain so, until we know more about this peculiar affection.

[Little can be added to this excellent *résumé*. The disease is not of infrequent occurrence and its recognition is of importance. In treatment emphasis should be laid on the point that a diet low in fat is desirable. Our experience with dried skimmed milk and a pudding made of casein and farina has been favorable. The course of the disease is long drawn out, and taxes the patience of the family as well as the attending physician.—Ed.]

Celiac and Allied Types of Infantilism. R. Miller[1] gives a critical review of the literature of celiac and allied types of infantilism and a complete bibliography comprising forty-seven papers.

A Fatal Case of Celiac Infantilism. R. Miller[2] reports the case of a boy who died at the age of 5½ years of influenza. He had suffered from celiac symptoms for nearly five years, had been under Miller's observation for nearly three years and was conspicuously stunted in growth. At autopsy no chronic changes to account for the protracted symptoms of diarrhea and large fatty offensive stools were found in the liver, pancreas, in-

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(1) Brit. Jour. Child. Dis., January-March, 1921.
(2) Lancet, April 9, 1921.

testines or elsewhere. This case seems to show that celiac disease is independent of morbid change in the organs mentioned. A detailed consideration of three autopsies reported in the literature in which intestinal lesions were found shows that they failed to prove that the excessive fat loss in celiac disease is due to an enteritis. Miller concludes that this disease is independent of organic changes and must be due to digestive fault, probably a defective action of the bile on fat absorption.

Acute Abdomen in Infancy and Childhood. G. A. Wall[3] has carefully considered the symptoms of acute abdomen in infancy and childhood and has reached the following conclusions:

The acute abdomen in infancy and childhood usually means intussusception or appendicitis.

The family physician does not give the condition enough thought and consideration and jumps at conclusions too quickly.

Early surgical interference is the only logical treatment for these conditions, and this can only be given by virtue of an early diagnosis.

Purgation should never be done until the diagnosis has been made, but in lieu of this, enemas should be given, since they are harmless and just as valuable.

Too much time is often wasted on laboratory tests in acute abdominal conditions, since they are of little value in arriving at a proper decision in this class of cases.

In all cases in which the diagnosis is in doubt, and the condition does not improve very promptly, an exploratory operation should be done, since in competent hands this is not dangerous.

Physicians should acquaint themselves more thoroughly with the clinical symptoms of the acute abdomen in infancy and childhood, by this means giving their patients the benefit of the proper remedial measures at the earliest possible moment.

HEART DISEASES

Studies on the Heart in Nutritional Disturbances in Infancy. H. McCulloch[4] made electrocardiograms from a group of sixteen athreptic infants admitted to the St.

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(3) Jour. Okla. State Med. Ass'n., January, 1921.
(4) Amer. Jour. Dis. Child., December, 1920.

Louis Children's Hospital, and in the case of two of these infants, alterations of cardiac mechanism were observed. The alterations consisted of a delay in auriculoventricular conduction, and changes in the form of the Q R S complex. As explanation of these disturbances the author suggests that they are the result of alterations in the blood and body tissues in these infants suffering from nutritional disorders. It is probable that the changes which have taken place in the blood result in a deficient supply of oxygen to the heart, with incomplete or delayed removal of metabolic products (acid metabolites) from the cardiac tissue. When improvement takes place in these athreptic infants the alterations in cardiac mechanism disappear. Measures adopted to relieve the nutritional disturbance seem to be the rational treatment for the cardiac condition as well. McCulloch has not observed any phenomena indicating heart failure in these infants.

Analysis of 250 Ward Cases of Acute Endocarditis in Children. The etiology, symptoms, physical findings, treatment and immediate results of the treatment of his 250 cases are discussed by H. P. Ledford.[5] In 48 per cent. the first attack occurred between the ages of 5 and 8 years. Endocarditis occurring with chorea was found to be much milder than that occurring with either rheumatic fever or tonsillitis. 60.4 per cent. gave a history of rheumatic fever, 14.4 per cent. a history of chorea, 12 per cent. a history of tonsillitis; 41.6 per cent. did not complain of any symptoms relative to the heart. The most constant symptoms complained of were dyspnea, precordial pain, palpitation and epigastric pain. The temperature was irregular in the majority of cases. The heart dulness was found moderately increased, and the more, the severer the disease. The leukocyte count varied considerably, as a rule it was determined by the severity of the disease. In the severe group 50 per cent. were above 20,000.

The choreic group showed a strikingly low leukocycte count. The mitral valve was involved in each of the 250 cases, the aortic in thirty-seven cases. Pericarditis occurred in thirty-two patients, of whom seventeen died.

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(5) Amer. Jour. Dis. Child., February, 1921.

The earlier the primary endocarditis occurred, the better the ultimate prognosis, but the worse the immediate prognosis. The treatment consisted largely of rest in bed. Attention to nutrition and physical condition was paid. Foci of infection were removed. Digitalis was rarely given. One hundred and six patients were discharged without active symptoms and supervised by social service and out-patient department; thirty-seven patients were discharged with active symptoms against advice; forty patients died.

Some Forms of Cardiac Irregularity. G. A. Sutherland[6] states that under certain conditions, sinus irregularity of respiratory origin is specially well marked. It is very common during the convalescent stage after acute illness, when the heart beats slowly. Owing to this fact, cardiac irregularity is sometimes diagnosed after an attack of pneumonia, or measles, or scarlet fever, and treatment may be ordered for what is only a physiologic variation in the cardiac action. In many intracranial diseases, such as meningitis, cerebral abscess or tumor, encephalitis, etc., the heart rate is slow and this sinus irregularity is well marked. In such conditions, also, the breathing is often irregular, being cyclic in character, and this will be reflected in an increased sinus irregularity of the heart. On the other hand, all illnesses or diseases which tend to increase the rate of the heart are accompanied by a diminution or disappearance of this sinus irregularity.

Sometimes there is present, in addition, some other form of irregularity, such as that due to extra-systoles, and there is thus a compound irregularity which may puzzle the clinical observer. In such case, it may be necessary to take a graphic record of the arterial and venous movements before one can decide as to the exact nature of this compound irregularity.

Extra-systoles or premature contractions are met with in childhood in connection with organic disease of the heart and also when no disease can be determined in the heart or elsewhere. In rheumatic heart disease, extra-systoles may occur during the active stage of carditis, but more frequently during the quiescent period

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(6) Archiv. Pediat., March, 1921.

when the heart rate has slowed down. Children of a nervous temperament not infrequently show extra-systoles, apart from any heart disease, which appear and disappear in the most puzzling manner. It is unwise to treat as the subject of heart disease a child in whom the only abnormal condition found has been an irregular action from occasional extra-systoles.

Pulsus bigeminus, due to extra-systoles, may have to be distinguished from pulsus alternans and from pseudo-pulsus alternans, associated with and due to very rapid respiration in the presence of a weakened circulation. It is probably dependent more on the disturbance in the circulation of the large intrathoracic blood-vessels than in the cardiac action.

In childhood, the indications for treatment by means of digitalis are usually a rapid and regular cardiac rate, accompanied by symptoms of cardiac weakness (breathlessness, edema, etc.). In order to secure benefit, it is now generally recognized that digitalis must be given in much larger doses than were formerly given, and that these doses must be continued until some of the physiologic effects of digitalis are induced. In doing so the regular action of the heart may be changed into an irregular one. In the slowing process the occurrence of extra-systoles is common and does not seem to have much significance. On the other hand, the onset of coupled beats is a danger signal and calls for immediate cessation of the drug. Certain other irregularities occurring under digitalis are referred to.

A common effect of digitalis therapy is the induction of sino-auricular block and this may be studied in its most characteristic form during childhood. It is recognized clinically by the occurrence of one or more apparently missed beats in the pulse; these missed beats increase in frequency so that there come to be periods in which they predominate, and alternating with them are periods in which the faster rate predominates. It is not a dangerous condition and does not indicate any serious heart complications, but, if it appears during the administration of digitalis, the drug should be discontinued for a time, as the vagal stimulation has gone far enough.

Exercise Tolerance of Children with Heart Disease. M. G. Wilson[7] concludes that the circulatory reactions after test exercises in forty-five normal children, and in 116 children with heart disease, confirmed the results obtained in the twenty normal children of the previous study in all essential points.

A working table was formulated of standardized test exercises followed by normal systolic blood-pressure curves, without symptoms of dyspnea and fatigue. It was standardized from an analysis of the reactions of an average group of sixty-five normal children according to age, weight and height.

The degree of distress and type of systolic blood-pressure curve following standardized test exercises was used as a gage in estimating the exercise tolerance of children with heart disease.

Of the seventy-one children having definite organic heart disease, without symptoms of insufficiency, 69 per cent. had a normal tolerance for standardized text exercise, 29 per cent. had a fair tolerance, and 2 per cent. had a poor tolerance.

In children with chronic organic heart disease, exercise tolerance tests give important and useful information which may be utilized as a scientific basis for intelligent regulation of the child's activities. The observations resulting from this investigation would seem to indicate that the fear of exercise is unwarranted, and that a wider latitude may be permitted with safety.

Roentgenologic Examination of the Infantile Heart. F. M. Groedel[8] states that size of the heart of small children can be ascertained by any roentgenologic method. After the school age has been reached orthodiagraphy or teleroentgenography must be used. Important information of the form and function of the heart may also be obtained. The author has maintained for years that insufficiency of pulmonary circulation are demonstrable roentgenologically long before clinical symptoms appear.

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(7) Jour. Amer. Med. Ass'n., June 11, 1921.
(8) Zeitschr. f. Kinderheilk, 1921, vol. 29, Nos. 1-2.

DISEASES OF THE BLOOD AND BLOOD-VESSELS

Calcium in the Blood of Children. W. Denis and F. B. Talbot[1] conducted a series of observations of the calcium and magnesium content of the blood of 119 children and found that a low calcium content of the serum frequently occurs in infantile tetany, acute rickets and in pneumonia. In one case of tetany there was a considerable increase in the blood calcium after the administration of calcium chloride by mouth. Several cases of epilepsy had a low blood calcium; the significance of these findings is as yet uncertain.

Vessel Thrombosis of Young Children. The basis of this paper by R. Hamburger[2] are twenty-nine cases of venous thrombosis and one case of arterial thrombosis in young children. Fifteen of the children were below the age of 1 year, nine were at the age of 1 to 2 years, and nine were from 2 to 4 years old. The youngest child was 11 days old. Most lesions were located in the brain, most frequently the longitudinal sinus, three times they were located in the renal vessels. The diagnosis is difficult and rarely made because the vessel thrombosis usually occurs as part phenomenon of a severe general infectious disease, and because it rarely causes symptoms directly attributable to a thrombosis. Thus in the cases of sinus thrombosis the edema of the face was present only twice. The author agrees with the conception of French authors that the cause of the thrombosis is always an infection. In half of the author's cases pathogenic microörganisms (staphylo-strepto-pneumococci) could be demonstrated in the thrombi or in various organs. The most prominent symptom, even in thromboses located at a distance from the brain, are convulsions; they were absent only twice in Hamburger's cases. They are explained on the basis of effect of a toxic substance produced by the infection. In the thromboses of the renal vessels uremic conditions may occur.

[We have occasionally seen septic thrombosis resulting from tonsillar infection in which advancing septic emboli

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(1) Amer. Jour. Dis. Child., January, 1921.
(2) Jahrb. f. Kinderheilk., 1920, vol. 91. No. 6.

occurred in the shin bone—producing osteomyelitis—abscesses in the lungs, and areas of softening in the cerebral cortex.—ED.]

Lymphatic Leukemia, with Report of a Case. A. J. Scott[3] points out that this disease occurs usually from 9 years up, and seems most prevalent in males. No real cause is known for the disease. Many theories are advanced, but they all sum themselves up into two general ideas, namely: (1), a type of tumor with metastasis; and (2), an acute infectious process.

An associated enlarged thymus is mentioned by several observers. The metabolism of leukemic blood is more active than normal blood. The nitrogen balance is usually negative in acute leukemia. Endogenous uric acid elimination and uric acid content of the blood is increased (nuclear destruction of blood cells). The highest white counts were reported by Cabot, where one case had 1,505,000, and another, just before death, 1,631,000.

The older the patient the better the prognosis. As a rule no patient recovers. The duration may be from a few days to six months for acute cases, the average being about three months. The *x*-rays and benzol seem to prolong life and in some cases, particularly in older individuals, seem to cure. Marked and increased anemia of the aplastic type is a constant finding in fatal cases.

The Roentgen-rays, softened according to the age of the patient, and fairly long exposure twice weekly, or every day with shorter exposures, or stronger rays at longer intervals, all have their advocates. Benzyl benzoate, 20 per cent. alcoholic solution, dose, adults 10 drops in water after meals, has been used successfully in one case reported by Haughwout and Asuzano.

Scott reports the case of a child of 4 years who developed a swelling of the neck on September 7, 1919. The spleen, cervical axillary and inguinal lymph glands were considerably enlarged. There were 43,000 whites with 92 per cent. small mononuclears. Under *x*-ray and benzol treatment the child improved, but died suddenly December 4 from an acute gastric hemorrhage.

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(3) Archiv. Pediat., December, 1920.

Aneurysms of the Thoracic Aorta in Children, with Report of Two Cases. J. K. Calvin[4] has been able to collect and review thirty-one cases from the literature, besides his two cases. Aneurysms may be due to atheromatous degeneration, rarely to trauma, to erosion of the aorta from without, to congenital malformation; probably the most important factor in childhood is acute infection.

The heart was hypertrophied in ten cases, the aortic valve was diseased in twelve cases, the mitral in eight. In seven cases the aorta was normal, in six atheromatous, in two there was an acute septic aortitis, in three a stenosis of the aorta near the aneurysm. The aneurysm was located in the ascending arch in the majority of cases; many of the symptoms were those due to the accompanying heart lesion with decompensation. Sudden onset, dyspnea, cough, precordial pain and palpitation were noted in a number of cases. Loud systolic murmur at the base, increased dulness over the aortic arch, systolic thrill and expansile pulsation were frequent physical findings.

The author reports his two cases in detail, one apparently following appendectomy, pneumonia and polyarthritis, the other chorea. In both cases the Wassermann reaction was negative.

ACUTE INFECTIOUS DISEASES

Factors Concerned in the Incidence of Contagious Diseases. It is maintained by A. I. Blau[5] that the three fundamental factors responsible for the incidence of contagion are errors in diagnosis, faulty quarantine and defective disinfection. Errors in the diagnosis of contagious diseases with resulting failure to quarantine lead to a spread of the disease. Failure to observe proper and effective quarantine is a particularly important factor in the transmission and spread of contagious diseases in the milder forms and during convalescence. This is especially true of scarlet fever and diphtheria.

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(4) Amer. Jour. Dis. Child., April, 1921.
(5) New York Med. Jour., May 18, 1921.

Late infection could be avoided if the patient were kept under strict quarantine until fully recovered, and the discharges from the mucous membranes had completely disappeared. The author states that he encounters cases of contagion not infrequently in premises which were the seat of that contagion weeks or months before. The periodical exacerbation of the incidence of contagion in the cold season and in the spring can be largely explained by a violation of quarantine, in the winter indoors and in the spring out of doors.

Etiology of Infectious Diseases. The fact that the number of hospital infections and cross infections always remained far below the number which might be expected at the ward for infectious diseases of the *Landeskrankenhaus* in Graz led A. Tobeitz[1] to believe that in the hospital the infectious patient signifies a comparatively slight danger for other patients, and that also in the outside world, especially during an epidemic, there must be other individual and external circumstances at play, besides the direct and indirect transmission from one person to another. He quotes his strikingly low figures of infections and cross infections during 1914 to 1918, in spite of the relatively small hospital, conditions of war, class of patients and probable carelessness of the employees. There were 1416 cases of diphtheria of which only five originated in the infectious wards; 1148 cases of scarlet fever, twenty-seven of which originated in the contagious ward; 1,070 cases of dysentery, five of which originated in the contagious ward; 1,217 cases of typhoid, seven of which originated in the contagious ward; 1,850 cases of erysipelas, seventeen of which originated in the contagious ward; thirteen cases of variola, three of which originated in the contagious ward; seventy-three cases of typhus, 1,307 cases of mumps, 490 cases of measles, with no cases traceable to contagion in the hospital. The author is led to assume that in the etiology of sporadic and epidemic infectious diseases, transmission is not only direct or indirect from one of the patients or from carriers, but that for certain cases the origin must be sought for in the individual himself, or in causes to be found in the external world. He attributes to me-

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(1) Archiv. f. Kinderheilk., 1921, vol. 69, Nos. 3-4.

tabolic changes in the host, influenced by individual and by external causes, such a significant influence on the parasitic and saprophytic organism which he harbors that, under especially favorable internal and external circumstances, microbes which are closely related to specific organisms in their morphologic and biologic properties, assume toxic specific properties and are able to infect their host or another individual. As example, the author cites the occurrence of scarlet fever after burns in individuals who have not been exposed to that disease. The metabolic changes caused by the burn changed the microörganisms which are related to the scarlet fever virus, and which are already present in the individual, so that they become virulent. The question how the known pathogenic microörganisms acquired their specific properties in the course of time is probably to be answered by saying that they were influenced at different periods of time by the biologic properties of their hosts, their mode of living and environment. With the increase of population transmission and epidemic extension were favored.

Unusual Instance of Multiple Infections. A. L. Hoyne[2] reports the case of a child who was sent to the hospital for intubation on the evening of March 3. Admitted as laryngeal diphtheria and scarlet fever (onset). Intubation was not done. The child was not placed with other diphtheria and scarlet fever patients having this double infection, but was isolated on first floor, owing to laryngeal condition. On March 4, in the morning, the diagnosis of laryngeal diphtheria was confirmed. Measles was considered but "excluded" on absence of Koplik spots. Scarlet fever (onset) was questioned. Chickenpox was diagnosed—one vesicle on foot. The child was transferred to fourth floor as diphtheria and chickenpox patient. Isolation separate.

March 4, evening: measles eruption appeared.

March 5, evening: scarlet fever eruption developed.

March 8, evening: chickenpox (profuse) eruption developed.

It will be observed from the foregoing that none of the

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(2) Archiv. Pediat., October, 1920.

diseases was contracted in the hospital. It may also be stated that no crossed infections resulted from this case, owing to the care with which it was handled.

Diphtheria

Does a Negative Schick Test Indicate Present and Future Security from Diphtheria? W. H. Park[3] states that this question can only be properly answered by considering not only whether the amount of antitoxin in the body which is sufficient to neutralize the toxin injected for the Schick test is sufficient to prevent diphtheria, but also whether a negative test indicates this; that is, whether there is apt to be error in the technique so that occasionally a negative outcome means a faulty injection or an improperly standardized toxin rather than a neutralization by antitoxin present in the body.

The Schick test can be compared with vaccination. A positive Schick reaction or a successful vaccination is a definite sign of a lack of immunity. A negative Schick or a negative result from vaccination is a strong suggestion of immunity but not an absolute assurance. In both cases this uncertainty is because of doubt as to the potency of the product and the accuracy of the technique. In either case, a repetition of the inoculation may be followed at times by a different result. Because of these facts it would be foolhardy to refuse to give a child antitoxin who had a history of a negative Schick test in the face of suspected diphtheria, just as it would be foolhardy to rely on a recent unsuccessful attempt at vaccination in the face of definite exposure to smallpox. Either improperly measured toxin or imperfect technique will probably prevent the development of the positive Schick reactions in susceptible persons. The failures are so few, however, that it is justifiable to consider that persons are in all probability immune who have a record of a carefully done negative Schick test

Park and Zingher consider the Schick test most reliable, when the toxin is of proper strength and the

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(3) Archiv. Pediat., June, 1921.

method of employing it is correct, in showing the presence or absence of antitoxic immunity to diphtheria. A negative reaction after the age of 2 or 3 years indicates that the individual is protected, probably indefinitely, against the disease. The great majority of positive reactions in children are true reactions and indicate an absence of antitoxin, and therefore, unless other antibodies are present, a susceptibility to diphtheria. They consider the test of great value in determining clinically the efficiency of the immunization of susceptible individuals, who have been injected with mixtures of diphtheria toxin and antitoxin. For this purpose only positive Schick cases should be chosen, and after the injections, they should be tested, one, three, six and twelve months later to determine whether a sufficient amount of antitoxin had developed early or late to inhibit the Schick reaction, showing thereby the production of an active immunity to diphtheria. They use the Schick test to clear up the diagnosis of clinically doubtful cases of diphtheria. A negative reaction excludes diphtheria, while a positive Schick reaction leaves the diagnosis of diphtheria still a probability. The Schick reaction has added further proof to the clinical and experimental observations that very toxic cases of diphtheria do better when given an early intravenous injection of antitoxin than when it is administered in any other way. It reveals the fact that an intravenous injection of antitoxin is able partly to neutralize toxin six hours after its absorption by the tissues and thus gives us hope in some of the late cases of diphtheria. The results with the Schick test will serve as a reminder that after contact with the tissues for more than a few hours the effect of the toxin can no longer be prevented; that a day and, in fact, hours of delay in the administration of a therapeutic dose of antitoxin may mean not only the absorption but the final binding of a fatal dose of diphtheria toxin.

Accuracy of the Schick Reaction. Influence of Variations in Diphtheria Toxin Content in Schick Outfits. A. Zingher[4] states that the accuracy of the Schick test depends on the strength of the toxin, the technique of

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(4) Jour. Amer. Med. Ass'n., Nov. 18, 1920.

the test and the interpretation of the reaction. Errors in any of these may make the results of the test unreliable. It is possible to guard against a poor technique and a wrong interpretation of the reaction, but it is essential to be able to depend on the accuracy of the outfits for the Schick test obtainable on the market.

The outfits furnished by four commercial laboratories were tested. Of five outfits of one laboratory, two contained too small an amount of toxin to give a positive reaction in Schick-positive children. Of three outfits of the second laboratory, one was somewhat weaker and two very much weaker than the standard outfit, so that negative reactions were obained in Schick-positive individuals. The outfits of the third laboratory compared fairly well with the control in the clinical test when twice the amount of toxin dilution prescribed in the directions on the outfits was injected. The animal test showed only about 85 or 90 per cent. of a minimal lethal dose in an outfit instead of one minimal lethal dose. The outfits of the fourth laboratory gave reactions similar to those noted with the control test.

Indication for Intubation. F. Hamburger[6] believes that intubation for diphtheritic laryngeal stenosis should be performed as late as possible. For years he has not intubated until there was marked and constant cyanosis. In the presence of choking attacks he intubates only when they occur in rapid succession and when they are uninfluenced by psychic stimuli. He does not believe that this method is more prone to lead to heart affection. Reintubation and secondary tracheotomy are also frequently obviated by waiting considerable time. It is important, he says, not to permit the anxious nurse to suggest early intubation.

[Why wait so long? The magic relief obtained by successful intubation seems sufficient indication for the operation. In skillful and experienced hands, an early operation for laryngeal stenosis obviates the danger of pneumonia, heart weakness, and prostration, and does no harm. How can one tell at what moment fatal asphyxiation may occur? In a case of progressive laryngeal stenosis with retraction of the soft parts of the

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(6) Münch. med. Wochenschr., March 11, 1921.

thorax, intubation is in our opinion, indicated without delay.—Ed.]

Operative Treatment of Diphtheritic Laryngeal Stenosis in the First and Second Year. E. Hermann[7] has made a study of the material of the Leipzig Children's Clinic to solve the question concerning the comparative prognosis in tracheotomies and intubations and emphasizes that intubation is superior in the hands of the experienced physician.

Late Intubation and Trial Extubation. J. Trumpp[8] takes issue with Hamburger's advice to wait with intubation as long as possible. Marked dyspnea is unfavorable because of its action on the already damaged heart. He advises intubation during the early stage of asphyxia. He also criticizes daily trial extubation, as reintubation is almost always necessary. He does not believe that the tube should be removed before the morning of the third day. Frequent intubations cause very undesirable trauma.

Secondary Tracheotomy in Intubated Patients and New Contributions to So-called Prolonged Intubation. Personal experiences with intubation extending over a period of 28 years and based on a material of 2,114 cases are reported by J. v. Bokay.[9] His results with this method are excellent. He is a strong advocate of primary intubation. As contraindication he accepts only mechanical inability to introduce the tube into the larynx. Primary tracheotomy was employed in only a few of his 2,000 cases. He also uses secondary tracheotomy as little as possible. Only the presence of severe decubitus is an indication for this operation. When intubation is very difficult he recommends the use of a bronze tube coated with paraffine or gelatine. It has the advantage of a small neck and a more distant location of the widening of the tube. With the use of this tube the author has obtained complete recoveries even in children who had to wear it up to twenty-nine days. He speaks of prolonged intubation when the removal of the tube is possible only after more than six times twenty-

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(7) Jahrb. f. Kinderhlk., 1920, vol. 93, No. 5.
(8) Münch. med. Wochenschr., April 15, 1921.
(9) Jahrb. f. Kinderhlk., 1920, vol. 93.

four hours. He reports seventy-three cases of difficult extubation with good results from the use of prepared ebony or bronze tubes. In only five of these were there any signs of severe dyspnea after several weeks. Three children were permanently cured after intubation, the fourth recovered after secondary tracheotomy. Only one child had to be permanently tracheotomized. Since the use of the diphtheria serum, the success with intubations has been much better than previously. von Bokay has had over 73 per cent. of recoveries in the last thirteen years. In the year following the introduction of the serum, recoveries mounted from 31 to 57 per cent.

Administration of Digitalis to Children with Diphtheria. From this study H. McCulloch[1] concludes that diphtheria toxin, either experimentally or clinically, produces anatomic and functional changes in the structures of the heart by direct action. Clinical manifestations of cardiac failure are due to these alterations of function and not to changes in the vagus center or nerve. The effect of diphtheria toxin on the heart is similar in many ways to the effect on the heart of digitalis, either directly or through the vagus nerve. The administration of digitalis to patients with diphtheria is contraindicated, because there would result a summation of effects in the same heart.

Diphtheria in the New-Born. Diphtheria of the newborn is localized most frequently in the nasal mucous membrane. Out of P. Esch's[2] thirty cases, other organs were involved only eight times. They were umbilicus, conjunctiva, skin, external auditory canal, pharynx and larynx. Five cases of diphtheria of the gastro-intestinal tract are especially remarkable. Nasal diphtheria was rarely accompanied by fever. Coryza was the prominent symptom. Post-diphtheritic paralysis followed in only two cases in the literature. The conjunctival diphtheria always began on the conjunctiva palpebrarum. Typical membrane formation and involvement of the cornea were rare. Diphtheria of the gastro-intestinal tract is at times associated with symptoms of melena. The umbilical diphtheria presented the picture of gangrene or a deep

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(1) Southern Med. Jour., February, 1921.
(2) Prakt. Ergebn. d. Geburts. u. Gynäkol., 1920, No. 2.

ulcerating process in the four cases of the literature. Prognosis appears to be dependent on the *genus epidemicus* and on the fact that 16 per cent. of the new-born possess no antitoxin. The source of infection may be bacteria carriers among the personnel of the clinic or visitors, also the maternal vagina. As prophylactic measure 50 units of serum were given subcutaneously and 0·1 of Behring's toxin-antitoxin mixture intramuscularly. Of ten new-born infants treated in this way, four fell ill nevertheless. This combined protective vaccination, therefore, does not prove efficient after an epidemic has broken out. It is probably better to immunize the new-born with 500 units of serum. Therapeutically 2,000 units of serum were given. The laryngeal stenosis was treated by means of a moist chamber improvised with a moist cloth, nasal respiration was kept free by instillations of adrenalin.

MALARIA

Malaria Among Children in Palestine. Sophie Rabinoff[3] has treated over 2,000 cases of malaria among children in Palestine. In comparing the symptoms of malaria in children with those in adults, there were several outstanding features. The chill is less frequently an initial symptom. There is a greater tendency to convulsions and other nervous manifestations such as restlessness, twitchings, fretfulness, or drowsiness. In addition, in children under 2 years, there were very frequently gastro-intestinal symptoms such as vomiting, constipation, diarrhea, and occasionally bloody stools. Also the interval between the attacks was, as a rule, marked by a striking return to normal appearance. It was not unusual to see a child, who at the height of the attack appeared desperately ill, seem in a few hours to be perfectly well. There was a much greater tendency to irregularity in temperature than in adults.

The youngest patient was an infant only a few hours old. The mother had suffered from chronic malaria for several years, with acute exacerbations from time to

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(3) Archiv. Pediat., August, 1921.

time. During this present pregnancy, she came to the clinic while in her seventh month and had received quinine hydrobromide together with morphine sulphate in very small doses. This seemed to keep the fever in check, although her blood would from time to time show tertian organisms. The author was called to the patient's home when the baby was 12 hours old. It looked blue and cold, face drawn and pinched, pulse feeble and very rapid. In view of the mother's history, a blood smear was taken at once. Four hours later the infant's temperature rose to 105° F. and quinine was ordered in doses of 1 grain every 2 hours. There was only a slight rise of temperature on the third day, and no recurrence.

Altogether there were treated fifty-nine cases in infants under 1 year, and of these, seven were under 1 month.

In the group with gastro-intestinal symptoms, many had simple diarrhea as the outstanding feature. Three children had bloody mucus stools as the only important symptom. One case with gastro-intestinal symptoms, simulated an attack of appendicitis.

The group of cases with pulmonary symptoms offered many difficulties in diagnosis, especially as the influenza epidemic appeared at the height of the malarial season, and one condition complicated the other. In a certain percentage of the cases, in which the indications pointed to malaria, or in which temperature and symptoms did not clear up, quinine was given despite the negative smear with prompt relief of symptoms. Many of these were latent cases lighted up during the period of lowered vitality attendant on the influenza.

A case of cerebral malaria occurred in a boy of 11 years. He was brought in during a convulsion. Examination of the blood was negative. After the convulsion, temperature was 104.8° F., the child appeared stuporous, cried when disturbed, or from time to time emitted a sharp cry. The head was retracted, there were a Kernig and exaggerated reflexes. Lumbar puncture gave clear fluid under moderate tension, and laboratory examination was negative. On the second day the condition was practically unchanged, although toward evening the temperature rose to 105.6° F., and the boy became very restless. Blood smear taken at this time revealed the estivo-autumnal parasite. Quinine was given by hypodermic and twenty-four hours later the child appeared quite normal, although there was still some rigidity of the neck, and the Kernig sign was still present.

Altogether there were sixty cases ushered in by convulsions. There were four cases of the malignant form of malaria associated with hemoglobinuria.

Enlarged spleens were noted in 70 per cent. of the children treated, the spleens varying in size from those that were easily palpable below the rib margin, to those that extended into the pelvis. In some cases the rapidity with which the spleen increased and decreased in size and consistency was remarkable. The chronic cases all had tremendous spleens and were hard to treat. Many of these ran a daily temperature from 100° to 101° F. and were extremely anemic.

In the treatment of the author's cases, quinine was given by mouth in all simple cases. When it was tolerated at all, it was given in fairly large doses. In a certain group of cases it upset the stomach when given in simple solution, but when made up with a simple syrup or with licorice, it was better tolerated. A small percentage of children do not tolerate the quinine at all when given by mouth, and in these it was given in suppositories or by hypodermic. In all the cases in which the attack was ushered in by a convulsion, or the symptoms were very severe, and in all cases of malignant tertian or estivo-autumnal malaria, the quinine was given by hypodermic in doses of ½ grain. All the quinine preparations are very irritating when given in this way, although the hydrochloride and dihydrochloride are the best. Attention should be given to other measures such as rest, proper hygiene, and simple, nourishing food. It is very difficult to make the patients continue the quinine after they are over the acute attack, and the result is that they continue to harbor the organisms somewhere until such time as their vitality is lowered, and a lighting up occurs. Chronic cases are very resistant, but in some cases in which quinine by mouth did not help at all, a course of six or seven doses given intramuscularly, and then followed by quinine and arsenic, given in the ordinary way, marked and rapid progress ensued. In ten cases the author used neosalvarsan intramuscularly, with apparent immediate benefit, but relapses occurred when this was not followed by quinine. Change of climate was found to be a very good adjuvant to the quinine.

MEASLES

Vaccine for Measles. The Editor of the *Münchener medizinische Wochenschrift*[4] discusses Degkwitz' experiments in the University Children's Clinic in Munich for the purpose of obtaining a measles vaccine or an animal immune serum. Degkwitz proceeded from his observation of the similarity of smallpox and measles and concluded that the well-known property of the smallpox organism, to lose its virulence and toxicity under changed conditions of life, might also be a property of the measles organism. He apparently succeeded in cultivating and attenuating the measles organism so that the cultures may be used as vaccines. Children who had never had measles were infected with these cultures, showed slight symptoms from thirteen to fifteen days after vaccination and were found to be immune to massive measles infection for weeks and months. The virus remains effective for several weeks through five or six generations. Human material has been added to the culture medium as source of protein. Experiments are being made to use animal material for this purpose in order to make possible vaccine production and measles prevention on a large scale. Apparently these experiments are successful.

Prophylactic Vaccination Against Measles with Convalescent Serum. Stimulated by Degkwitz's investigations, F. v. Torday[5] has vaccinated 261 children exposed to measles on thirty occasions with convalescent serum. Of these, 246 remained well, fifteen developed measles. Sixty-seven were infants: of these four developed measles; ninety-seven were from 1 to 2 years old, of

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(4) Münch. med. Wochenschr., June 24, 1921.
(5) Zeitschr. f. Kinderheilk, 1921, vol. 29, Nos. 3-4.

these five developed measles; of fifty-eight from 2 to 6 years, three developed measles; of thirty-nine children from 6 to 14, three developed the disease. The author emphasizes that his facilities were limited so that only small amounts of serum could be injected and frequently late, *i. e.,* on the eighth to ninth day after exposure. Of sixty-five children who received the serum from two to six days after infection only two developed the disease. The author concludes that small doses of convalescent serum—3.5 to 4 c.c.—when injected in time will protect against measles. The optimum time for obtaining the serum is probably one week following convalescence. With reference to the duration of immunity following the injection, the author has observed that two of his patients developed measles seventy-two and seventy-five days after the injection. On the other hand, in a ward containing immunized children, to which two months later a child with measles was admitted, no case of the disease developed.

Measles Prophylaxis According to Degkwitz. Degkwitz has been able to protect young infants from measles by injecting from 3 to 4 c.c. of measles convalescent serum obtained about two weeks after the disease. Rietschel[6] has confirmed Degkwitz's experiences during a small epidemic at the University Children's Clinic in Würzburg.

On December 20, one child in each of two wards developed measles. On December 22, and 23, all children who had not had measles were injected with the serum. Three children who were exposed most, received 10 c.c. of the defibrinated blood of a measles patient whose fever had subsided on Dec. 23. The other four children each received 10 c.c. of the defibrinated blood of a child who had had measles four years previously. All seven children remained well. Rietschel points out that the quantity of blood needed is so large that probably serious objections will be raised by the mothers and the general practitioners. He, therefore, recommends the injection of maternal blood. Degkwitz himself has tried this on six children. Two of these remained perfectly well, the four others developed a very light form of the attack. Riet-

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(6) Zeitschr. f. Kinderheilk, 1921, vol. 29, Nos. 3-4.

schel injected three children who had been exposed with 20 c.c. of adult blood. They developed a light form of the disease, whereas five other children who had not been injected developed typical measles with complications.

In a second epidemic, six children were injected, two of these developed measles, one a typical form of moderate severity with otitis media. The other child developed a light form. In both of these the incubation period was twenty days. Later the author observed another patient who had been injected with typical measles and two with a light form. He concludes that the serum from adults is not a certain prophylactic measure though it usually renders the disease lighter and less prone to complications, which may be more desirable than complete prevention.

[Prophylactic injections of immune serum should be employed in institutions where epidemics threaten or where a measles outbreak has occurred. A larger experience with this form of immunization is desirable.—Ed.]

VARICELLA

Hematology of Varicella in Children under Two Years. G. Baer[7] investigated the blood picture of varicella during an epidemic at the Universitätsklinik at Jena. Seven cases were submitted to careful and frequent blood examinations during the period of incubation, during the active stage of the disease and during convalescence. These determinations led the author to the conclusion that during the incubation period of varicella in children under 2 years of age there is not rarely a relative lymphocytosis, that after the eruption of the exanthema a distinct leukopenia is found and that a marked diminution of eosinophiles is the rule during the height of the disease, and that the count of the other leukocytic forms does not show a typical behavior.

[Varicella offers a field for more extensive and corroborative hematologic investigation.—Ed.]

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(7) Archiv. f. Kinderheilk., 1921, vol. 69, Nos. 3-4.

MENINGITIS

Influenzal Meningitis. Josephine B. Neal[8] reports a series of thirty-two cases. Only two patients were more than 5 years old, one of these being 7 and one 18 years of age. Sixteen of her cases were in children one year old or less.

She was able to locate a probable primary focus in only eight instances, and of these, six were cases of pneumonia, one clinical "influenza," and one a cold and cough. The cases showed a tendency for the disease to develop in the fall and early winter.

In the fall of 1918, when the epidemic of influenza was raging in New York City, the author saw only one case of meningitis due to the Pfeiffer bacillus. This has seemed to her good evidence against the Pfeiffer bacillus being the causative factor of this epidemic.

There is nothing characteristic in the symptomatology of influenzal meningitis. Two cases even had a hemorrhagic rash, which is so often considered diagnostic of epidemic meningitis. The course of the disease varies greatly, from two or three days to a month or more. It is usually well over a week.

A study of thirteen cases in which recovery took place, shows that the treatment was as follows: In nine instances lumbar puncture alone was used; in one instance electrargol was given intravenously daily for a week; in two instances anti-influenza serum was used; in one, vaccine was given intraspinally.

An anti-influenza serum, prepared by Wollstein in 1911, produced favorable results in experimental influenzal meningitis in monkeys. Neal used it in five cases; in three of these only one or two injections were given; in the other two, the injections were repeated about ten times in one instance and fifteen times in the other. These last two patients showed temporary improvement clinically; the organisms decreased greatly in number and became largely intracellular, but death finally resulted.

Recoveries from purulent meningitis, due to organisms other than the meningococcus, are few. Most of these

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(8) Archiv. Pediat., January, 1921.

have occurred after lumbar puncture alone. In view of this fact, the author emphasizes the fact that she does not assert that intraspinal vaccine treatment cured the case of staphylococcus and of influenzal meningitis respectively described by her, nor that the intravenous administration of vaccine cured the case of blocked epidemic meningitis to which she referred. However, recovery did follow the use of vaccine in these cases.

In the absence of methods promising better results, it seems worth while, in addition to the use of a homologous serum, where such is available, to try the intraspinal or intravenous administration of vaccine in suitable cases. This course would be indicated under the following conditions: in cases of meningitis not due to the meningococcus, in blocked forms of epidemic meningitis and in other cases of epidemic meningitis, which do not yield readily to serum treatment.

Influenzal Meningitis with Report of a Case. I. A. Abt and I. H. Tumpeer[9] report a case of meningitis caused by an organism resembling the influenza bacillus. The bacillus was isolated from the spinal fluid, blood, throat, nose and nasopharynx. The patient was a white boy 17 months old, who developed a temperature of 102.4° F. three days before admission to the Sarah Morris Hospital. Paracentesis yielded pus from both ears. Internal strabismus of the left eye and marked rigidity of the neck and extremities were found on physical examination. There were 7,600 leukocytes. Spinal puncture showed 3,500 cells of which 84 per cent. were polymorphonuclears. The Wassermann test was++++. Smears of the pellicle showed many polymorphonuclear cells and a Gram-negative pleomorphic bacillus. Cultures yielded the same organism. Spinal fluid containing 10,000 cells and the same organism was obtained on the following day and 2 gr. of ethylhydrocuprein were injected. The temperature rose to 105.4° F. on the next day; the child became comatose and died ten days after the onset.

From reviewing the literature the authors find that the cell count of the spinal fluid in influenzal meningitis varies, but that most observers report the predominance

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(9) Amer. Jour. Dis. Child., May, 1921.

of polymorphonuclear cells. The pleomorphism of the organism in this type of meningitis raises the question of its classification. It is invariably homoglobinophilic. Many believe that the organism producing meningitis is quite distinct from Pfeiffer's bacillus. The organism in the author's case was not pathogenic for guinea-pigs, rabbits or mice. The pathogenicity as observed by others varied. The middle ear plays an important rôle in the development of influenzal meningitis in children.

In regard to prognosis, more cases of influenzal meningitis occur in infants and young children than in adults, and the process is more severe in children. Stone collected 105 cases, with a mortality of 91.4 per cent., nine patients recovering.

The authors arrive at the conclusion that influenzal meningitis is accompanied by a widespread distribution of the influenza bacillus in the upper respiratory tract and that the organism is easily cultivated from the spinal fluid and in many cases from the blood. The organism from the spinal fluid is usually pleomorphic, showing many long thread forms. It seems plausible that the pleomorphism is but a minor variation from the so-called typical influenza bacillus, and that this may be due to the peculiar conditions of its habitat. Spinal fluid usually contains a large number of polymorphonuclear cells which show no tendency to phagocytosis. The blood count does not give the typical leukopenia of respiratory influenza. Animals show a variable response to injections of the organism, although the bacillus is usually pathogenic for laboratory animals.

The most rational treatment at the present time is the administration of convalescent or normal serum and frequent removal of spinal fluid. The serum contains antibodies and promotes phagocytosis, and spinal puncture removes fluid and increases phagocytosis.

Case of Meningococcus Meningitis with Obstructive Hydrocephalus in the Newly-Born. The case of a male infant aged 5 weeks, who was not seen until the symptoms were quite definite, is reported by J. H. Root[1]. He showed at this time a temperature of 103° F., frequent convulsions, twitching, vomiting (not projectile), bulg-

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(1) Amer. Jour. Dis. Child., May, 1921.

ing fontannelle, retracted neck, very large head with separated sutures, and questionable Kernig. The parents stated that he had been restless and irritable since birth. The first symptom was a mottled rash at the age of 10 days. This was followed in a few days by thrush, and from then on occasional attacks of fever. At 2 weeks of age, slight retraction of the head was definitely noted, and vomiting began at this time. The vomiting was not severe, however, until the infant was 4½ weeks old. The first convulsion occurred on the thirty-third day, and the child was brought to the hospital on the thirty-fifth day. The fact that the head was so large in size with separated sutures, that there was choked disc on both sides, and especially that only a few drops of fluid were obtained on lumbar puncture, while a large quantity was obtained on ventricular puncture, establishes the diagnosis of obstructive hydrocephalus associated with the meningitis.

Meningococcus meningitis in the new-born and in early infancy is rare. Only one case of meningococcus meningitis with obstructive hydrocephalus developing during the acute stage of the disease was found in the literature. The symptoms are usually irregular and obscure. The most important ones are repeated convulsions, vomiting (not projectile), and after a week or more, bulging of the fontannelle and rigidity of the neck.

Meningitis, Caused by Lead Poisoning, in a Child of Nineteen Months. Lead poisoning is uncommon in children. R. A. Strong[2] reports the case of a boy 19 months old admitted to Richard Milliken Memorial Hospital for Children of Charity Hospital on Oct. 5, 1919, for persistent vomiting and a diarrhea of mild type. His temperature on admission was 99° F. About ten days before, the child had been seen to bite paint from the rail of the bed, and he began vomiting his food a short while thereafter. Previous to admission the child had been healthy, and teething; growth and development had been normal.

Physical examination revealed hypertrophied tonsils. Vomiting was persistent. The stools, four or five a day, were green and contained much mucus and curds. At

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(2) Archiv. Pediat., September, 1920.

the end of about ten days, the child had improved very much and had responded to ordinary dietetic management.

One morning the nurse on the ward discovered him biting on the painted rail of the bed, and an examination revealed the fact that he had bitten off some of the paint from the bed. His stomach was washed and he was given a cathartic. After twenty-four hours he vomited his food and the persistent vomiting and moderate diarrhea returned. These symptoms continued for a week and that the lead was the cause of the trouble now seemed the most logical belief. This was confirmed on or about the eighth day when stippled red cells (Grawitz's granules) were demonstrated. Almost at the same time a blue lead line was observed on the gums near the upper incisors.

On the tenth day, after the recrudescence of the vomiting, distinct meningeal symptoms appeared. The head was retracted and the extremities were extended and rigid. Kernig's sign was negative. Brudzinski's neck sign was positive. Brudzinski's contralateral reflex was negative. Ptosis of the left upper lid was occasionally present, and the child was comatose the greater part of the time. The temperature did not go above 100° F., except just before death, when it rose rapidly to 103° F.

The fluid findings were those of a serous meningitis. No lead was found in the fluid.

MUMPS

Aural Complications from Mumps. Albright[3] speaks of aural complications of acute epidemic parotitis and summarizes his article as follows:

Deafness, unilateral or bilateral, may occur as a sequel to mumps. This is usually sudden, profound and persistent.

The site of the lesion is probably in the labyrinth. In nature it is probably a serous or hemorrhagic exudative affair.

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(3) Iowa State Med. Jour., February, 1921.

More opportunity for study is needed by the aurists.

Treatment except preventive is probably without any particular value.

PERTUSSIS

Whooping-Cough Contracted at the Time of Birth, with Report of Two Cases. J. Phillips[4] reports two cases of whooping cough occurring during the first months. The infection in each of these cases was from the obstetric nurse who was in the first week of her attack of whooping cough. Her cough was not of sufficient severity that she considered it necessary to report to the obstetrician. In the first case, at the time of labor, she assisted the regular nurse for twenty-four hours, and then went to the second case, this baby being born three days later. In the first case the infant began to cough on the tenth day. The cough increased in severity and on the fourteenth day after birth the infant began to whoop. During the paroxysms the baby became deeply cyanosed and on the morning of the twenty-first day, she became stuporous and comatose, developed a paresis of one side of the face and died.

In the second case the infant began to cough on the eighth day and to whoop on the twelfth. The disease ran a moderately severe course for six weeks, the number of paroxysms varying from twelve to twenty in twenty-four hours at the height of the disease. Following this attack the baby recovered and thrived well.

Pathogenesis of Convulsions in Early Childhood. F. Reiche[5] analyzed twenty-nine cases with convulsions from the whooping-cough ward of the General Hospital, Hamburg-Barmbeck and believes that there is a true whooping-cough meningitis. The hypothesis advanced by others that the convulsions are due to spasmophilic diathesis seemed not to apply in most of his cases. He reports three cases of whooping cough with convulsions, the first in a rachitic child in whom convulsions and fever were present shortly before death; the second is of interest because of its favorable course; in the third case there

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(4) Amer. Jour. Med. Sci. February, 1921.
(5) Münch. med. Wochenschr., Feb. 18, 1921.

were increased spinal fluid pressure and increased chloride content in the spinal fluid. The patient improved and recovered with bromide therapy.

Vaccine Treatment of Pertussis. R. K. Rewalt[6] has used the vaccine consisting of the Bordet bacillus alone in 130 cases of pertussis. A mixed vaccine containing the Bordet bacillus, the pneumococcus, the streptococcus and the staphylococcus was used in some cases, chiefly the ones complicated by or following pneumonia. The 130 cases extend over a period of seven years. In the earlier cases treated the results were not so good as in the later cases, probably due to the fact that the doses were too small.

In a total of six cases the treatment was an absolute failure. In forty-five cases benefit of more or less degree was obtained. The other seventy-nine cases showed marked improvement. In infants an initial dose of 250,000,000 to 500,000,000 was used and was increased to 1,000,000,000 or more as the symptoms demanded. From three to eight doses were given at intervals of from forty-eight to seventy-two hours. More than eight doses were not considered necessary. In older children an initial dose of 500,000,000 was given and each succeeding dose was doubled as was deemed necessary.

[Investigations have shown that in order to obtain results the dose should be sufficiently large and the vaccine should be fresh.—Ed.]

Treatment of Whooping Cough. With the more extensive use of pertussis vaccine in the prophylaxis and treatment of whooping cough, one often hears of isolated cases which respond little or not at all to vaccine treatment. Luttinger[7] says that such failures are usually due either to the vaccine itself, the inexperience of the physician as to the proper dose and administration, or to constitutional inability of some patients to respond to vaccine stimulation.

In order to obtain successful results in the treatment of whooping cough with vaccines, one must secure the following:

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(6) Penn. Med. Jour., March, 1921.
(7) New York Med. Jour., April, 1921.

1. A fresh Bordet-Gengou bacillus vaccine, from a reliable laboratory.
2. Relatively high doses should be administered, subcutaneously, at regular intervals and as long as the whoop persists.
3. Strict attention to hygiene and feeding so as to insure a maximum of response to vaccine stimulation.
4. The establishment of special whooping-cough clinics by departments of health, where the vaccine treatment would be accessible to all.

PNEUMONIA

Gastric Dilatation in Pneumonia in Children. The objective findings in this condition are characteristic, says Kerr.[1] Inspection often reveals a visible and palpable tumor in the upper abdomen, although not always in the normal stomach position because the organ may be displaced. Immediately after vomiting this may be reduced. While the whole abdomen may be enlarged and tympanitic, the upper portion is more prominently so. If the distention is great or the abdominal walls thick, the stomach may not be readily outlined. Percussion findings will depend upon whether the contents of the stomach are gaseous or fluid.

Usually after a few hours the pinched features and the objective evidence of circulatory shock are marked. The pneumonia continues its usual course for several days, when rather suddenly the symptoms just described become more or less prominent, causing much anxiety to all concerned. Or they may become immediately alarming, with all methods of treatment and medication proving of no avail. The child dies. From discussion with a large number of fellow-workers, the author knows that the symptoms caused by acute gastric dilatation are not laid to that condition, but are supposed to be due to cardiac failure, dilatation not having been suspected. This explains in part the failure of cardiac stimulants: they are misapplied.

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(1) New York State Jour. Med., November, 1920.

While attending a clinical meeting it was reported to Kerr that one of the children in the pneumonia ward was dying. This was at 8:30, and his examination revealed that the respiration had suddenly risen from 61 to 90 a minute, although the temperature remained stationary. The child was remarkably cyanotic and uncontrollably restless. There had been one sharp attack of vomiting earlier. The whole abdomen was enlarged, but more so in its upper portion. The stomach was immediately washed out and orders left that nothing be allowed by the mouth for at least twelve hours. No medication was given, although it is the author's usual practice to administer a small amount of morphine by hypodermic. He wished to impress the interne with what could be accomplished by lavage alone to meet what he termed "cardiac failure." Immediately following the lavage the child became quiet, fell asleep in ten minutes, and one hour later when the respirations were taken, they were down to 41. When Kerr saw the child again at 11 o'clock (two and a half hours after the examination revealed the acute dilatation) the child was still asleep, quiet, and without the slightest evidence of cyanosis.

The lavage helped to reduce the shock. Kerr is convinced that if the lavage had not been done or its performance had been delayed for a few hours this child would have died and the death would have been attributed to cardiac failure.

Treatment must be prompt and adapted to the immediate condition of the stomach. If percussion reveals much fluid the foot of the bed should be elevated for from twelve to eighteen inches and the left anterolateral abdominal position assumed. The head may overhang the edge of the bed and the left arm be allowed to hang or rest upon a chair, while the back is supported by pillows from neck to heels. The next essential is efficient lavage. The physician must be prepared to follow it up with continuous lavage. This is accomplished by inserting a small tube through the mouth or nares, securing it by adhesive to the cheek. This avoids the repeated introduction of the larger tube.

The next essential is the absolute withholding of everything by mouth for at least twelve hours and often longer. To limit or prevent a starvation acidosis, it is permissible to administer by proctoclysis a solution of bicarbonate of soda and glucose. For acute dilatation, firm pressure is made for several seconds across the spine in the interspaces between the third and fifth thoracic vertebrae; this causes an explosive eructation of gases.

A procedure which may be desirable, is the administration by hypodermic of small doses of morphine. The author has not used eserine or atropine, although they may be of service.

In lobar pneumonia in children there exists a definite mortality factor whose importance can not be appreciated unless the possibility of its occurrence is recognized. Kerr feels now that it is just as important to provide the simple apparatus for lavage as to carry the stethoscope. His examinations are now more directed to the abdomen than the chest; inspection and palpation of the former are much more frequently done than percussion and auscultation of the latter. As this serious accident is more apt to occur just before or at the time of the expected crisis, the occurrence of cyanosis, restlessness, and exhaustion should result in immediate and complete examination of the abdomen. If this is done the author has no doubt that the rarity of cardiac crises will be appreciated; that the symptoms commonly attributed to the heart will find their explanation in acute gastric dilatation; that the failure of all stimulants at the time will be explained, and with the prompt application of the adequate measures efficiently to meet the emergency, some of the children will be spared.

[After all, one can not be certain that gastric and intestinal dilatation are not secondarily the results of altered circulatory conditions resulting from cardiac embarrassment.—ED.]

TUBERCULOSIS

Epituberculous Infiltration of the Lung in Tuberculous Infants and Children. H. Eliasberg and W. Neufeld[2] call attention to the fact that there are cases of

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(2) Jahrb. f. Kinderhlk., 1920, vol. 93, No. 2.

pulmonary tuberculosis which clinically and roentgenologically present the picture of a severe infiltrative process, but which run a benign course, so that it must be assumed that they are forms deviating from the ordinary pulmonary tuberculosis. Children with tuberculous processes in various organs and tissues and with positive v. Pirquet reaction gradually recover, contrary to expectations. The lung infiltration does not increase; instead it decreases after months and finally disappears entirely. In the Roentgen picture only a markedly increased hilus shadow is found corresponding to large paratracheal and bronchial glands. This process is called epituberculosis. Pathogenetically it is believed that there may be a similar process as in the gelatinous infiltration of Laennec and that not tubercle bacilli produce infiltration, but rather their metabolic products. The disease runs a favorable course without special therapy; all measures directed to influence the tuberculous process are unnecessary.

Clinical Experience with Tuberculin Diagnosis. In studying the statistics of the Freiburg Children's Clinic from 1913 to 1918, C. T. Noeggerath[3] finds that the v. Pirquet reaction is inadequate and should always be combined with the subcutaneous reaction of Escherich. He attributes the frequency of negative v. Pirquet reactions to a partial anergy of the skin due to underfeeding because of the hunger blockade. The Roentgen ray is an important control for diagnosis, but care must be taken in the diagnosis of bronchial gland tuberculosis in the presence of broadened hilus shadow. Errors may be avoided in some cases by taking another picture with the child inverted on the table. It is then frequently seen that the increased shadow was due to circulatory stasis.

Diagnosis and Prognosis of Tuberculosis in Infancy. The conclusions presented in this paper by C. H. Dunn and S. A. Cohen[4] are based on a series of 374 cases in which a clinical diagnosis of tuberculosis was made in the wards of the Infants' Hospital, and on a series of 138 necropsies in which lesions of tuberculosis were

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(3) Monatsschr. f. Kinderhk., vol. 18, No. 5.
(4) Amer. Jour. Dis. Child., February, 1921.

found. In the authors' series of 661 consecutive necropsies in children under 2 years, 138 or 20 per cent. showed tuberculous lesions. The authors recommend the Hamburger classification of tuberculosis into three stages, the primary stage being represented by the primary lesion and the associated lymph node involvement; the secondary stage by all the lesions produced by the further invasion of the body by the tubercle bacillus, and the tertiary stage being represented by the chronic destructive lesions such as the bone and joint tuberculosis of childhood, and the phthisis of adult life.

In general, so far as the diagnosis of the primary stage of tuberculosis is concerned, the following conclusions appear to be warranted: A positive v. Pirquet reaction is the only evidence pointing toward a primary intestinal infection, and the diagnosis of this form of the disease can not be made unless either the v. Pirquet is positive or the physician is fortunate enough to find tubercle bacilli in the stools. Primary intestinal tuberculosis is, however, very rare in comparison with a primary focus in the lung, and it is in the recognition of this latter condition that special methods of diagnosis are particularly needed. If either the v. Pirquet reaction is positive or even suspicious, or if the roentgenogram of the chest shows the shadow characteristic of tracheobronchial lymph node enlargement, a diagnosis of tuberculosis primary in the lung may be made with a fair degree of certainty. If the sole evidence is a positive or even suspicious d'Espine's sign, or interscapular dullness, the diagnosis may be made with only a slight degree of probability.

In all cases in which all three of these forms of evidence are absent, tuberculosis in the primary stage should not be diagnosed. In cases of the secondary stage of the disease the diagnosis so frequently depends on ordinary clinical evidence that these special methods of investigation are unnecessary. There are, however, two secondary forms of the disease in which the diagnosis is more difficult. These are tuberculous bronchopneumonia and general miliary tuberculosis involving the lung and abdominal organs but in which the brain is spared.

The characteristic sign of tuberculous bronchopneumonia in the infant is the finding of evidence of pulmonary consolidation. In general, these cases tend toward a rather chronic course, but some of them are fully as acute as ordinary cases of non-tuberculous pneumonia. No very reliable conclusion can be drawn from the extent and distribution of the consolidation as shown by physical examination. It is important in all these cases to determine whether the consolidation is due to a tuberculous pneumonia or to a pneumonia from some other cause. For this purpose we must rely on the v. Pirquet reaction, the examination of the chest for signs of tracheobronchial lymph node enlargement, and the results of roentgenograms of the chest.

The authors conclude from these studies that in the majority of cases showing pulmonary consolidation, in which either the v. Pirquet reaction or the Roentgen ray is positive, the correct diagnosis is tuberculous bronchopneumonia. In a few cases, however, the diagnosis of tuberculosis will either be wrong or else there will be a combination of the primary stage of tuberculosis with a non-tuberculous pneumonia. Roentgenograms will usually permit the observer to distinguish between tuberculous and non-tuberculous pneumonia. In the tuberculous form the shadows are much more distinct and sharply outlined. Many plates show the characteristic speckled or spotted appearance which is never seen in non-tuberculous pneumonia. When there are large areas of consolidation the shadows are usually much more dense. Occasionally a speckled or spotted plate means acute miliary tuberculosis of the lung with conglomerate tubercle formation and without the lesion of pneumonia. Such cases may be recognized through the absence of signs of consolidation of the lung on auscultation and percussion.

The mortality in the hospital of the 367 cases diagnosed as tuberculosis was 53 per cent. Tuberculous meningitis was the most common cause of death, tuberculous bronchopneumonia standing next in frequency. The secondary form usually developed within a comparatively short time after discharge, usually before the end of the second year of life.

The prognosis of infantile tuberculosis is best when the patient shows evidence that the disease has not advanced beyond the primary stage, but is still not good, owing to the tendency of the infant to develop fatal forms of the secondary stage. This tendency is greatest in infancy, and grows less as the child grows older.

D'Espine's Sign in the Diagnosis of Bronchial Gland Tuberculosis. K. Klare[5] considers this sign the most dependable aid in diagnosis next to the Roentgen ray. Distinct bronchophony, down to the fifth or sixth thoracic vertebra, call for a control by the Roentgen ray. Slight bronchophony to the third vertebra indicate only a slight process and do not necessitate Roentgen rays. A certain amount of experience is necessary to insure correct interpretation of the phenomenon.

Early Test for Active Tuberculosis in Children by the Aid of Wildbolz' Autogenous Urinary Reaction. O. H. Kotzulla[6] has tested out Wildbolz' method for determining the presence of active tuberculosis by injecting intracutaneously the patients' urine which has been concentrated to one-tenth its original volume. In the presence of active tuberculosis, the injected area becomes infiltrated and reddened after forty-eight hours. Kotzulla has tested out this method on forty children and comes to the conclusions that the reaction is specific for active tuberculosis, except in the case of nephritis and staphylococcuria, in which the reaction may be positive without tuberculosis. It is not applicable to renal tuberculosis, if both kidneys are involved. This method correctly applied reveals tuberculosis in the child earlier than the clinical and biologic methods now in use. The transmission of antigens from a proliferating, clinically not demonstrable tuberculous focus into the blood stream and from there into the excreta can be demonstrated earlier than the occurrence of anatomic changes in the focus.

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(5) Zeitschr. f. Kinderhk., 1920, vol. 27, Nos. 3-4.
(6) Ibid., 1921, vol. 29, Nos. 1-2.

Roentgen Ray and Tuberculosis in Infants and Children. A Study of Forty-four Cases. F. W. O'Brien and F. B. Ames[7] have found that the v. Pirquet and intracutaneous skin reactions are reliable guides to infection with tubercle bacilli, and that the number of positive reactions increases from infancy up through childhood, over 10 years of age, all patients reacted. In twenty-six or thirty-six positive skin reactions, the Roentgen ray disclosed the site of infection to be intrathoracic.

D'Espine's sign as a clinical index of tuberculosis of the bronchial lymph nodes is of relatively little value, being elicited only eleven times, as against Roentgen-ray evidence of glandular enlargement in twenty-eight cases. Three cases of positive sputum were found in fourteen diagnoses of chronic pulmonary tuberculosis. Fourteen cases of chronic pulmonary tuberculosis of the adult type were found. This suggests that the so-called phthisis is more common in children than has been stated by writers of text-books.

Fifteen cases, negative clinically, showed definite Roentgen-ray signs of marked structural changes consistent with tuberculous infection. This raises the question as to whether these children are to be regarded as more likely to develop clinical tuberculosis and should thus be watched carefully and roentgenographed at fairly frequent intervals.

[D'Espine's sign, properly applied and correctly interpreted, is usually thought to be of greater value than is conceded by the authors.—ED.]

Complement Fixation for Tuberculosis in Children. J. V. Cooke[1] gives the results of the examination of a large number of serums from infants and children by the complement-fixation test using an antigen made from human tubercle bacilli; 1,855 fixation tests were done on 1,556 children from the Pediatric Clinic of the Washington University and from the wards of the St. Louis Childrens' Hospital. There has been a striking relation between the age of the child and a positive fixation reaction. More than 80 per cent. of those over 6 years

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(7) Jour. Amer. Med. Ass'n., May 28, 1921.
(1) Amer. Jour. Dis. Child., January, 1921.

of age gave positive reactions, a proportion similar to that found in adults, while none in the first year reacted positively to the test. From the second to the sixth year gradually increasing numbers of children developed fixing antibodies. There are two possible factors in the failure of infants and young children to develop complement-fixing substances in the blood. The duration of the infection may influence their formation and the younger children may have had the infection too short a time for the development of such antibodies. This explanation seems less likely than that young animals may form antibodies much less readily than older ones. The absence of fixing bodies in tuberculosis of infants and in a considerable proportion of younger children may have some relation to the very rapid spread of the disease at this time of life which is commonly observed, since the inability to form fixing antibodies may be associated with a lack of power to form other protective antibodies.

The absence of complement-fixing antibodies in young children has little importance in the question of diagnosis since it is at this age that the tuberculin skin tests are of greatest value in calling attention to an active infection. In older children the skin tests do not always indicate the presence of an active tuberculous process, and it is here that the complement-fixation test is of particular value, because of the high proportion of tuberculous children who give a positive reaction.

In a large number of children the tuberculous infection, usually of the tracheobronchial glands, is slight in extent and the process is masked by the relatively insignificant clinical signs that are commonly present. There seems little doubt that in these cases the infection is pathologically active since there is sufficient continuous absorption from the tuberculous focus to produce complement fixing antibodies. The children of this masked tuberculosis group give positive complement fixation reactions in the same proportion as those with manifest tuberculosis. The test is consequently of great aid in calling attention to this rather common and frequently overlooked type of tuberculosis in children. Additional evidence that a positive fixation test is associated with a pathologic activity of the tuberculous process is furnished by the relatively small number of children with clinically healed tuberculosis who give positive reactions.

Certain non-specific reactions may occur in children with congenital syphilis and a strongly positive Wassermann test, and also in cases of diphtheria, for several months after the acute attack. This should be borne in mind to prevent misinterpretation of positive fixation reactions in these conditions. In more than 1,000 other cases in which no clinical tuberculosis could be demonstrated, positive fixation reactions were found in less than 5 per cent. The great difficulty in absolutely excluding tuberculous infection by present diagnostic methods suggests that some of these apparent "false positives" may not be quite free of the disease.

The test has proved of considerable value not only in calling attention to cases of tuberculosis without well-defined clinical signs, but in making a decision regarding the presence of active tuberculous foci in children exposed to the disease and also in following the course of a healing lesion. The complement-fixation reaction, must not be considered however, a relatively easy and infallible method of diagnosing an active tuberculous process. It is of most value when used as an aid to a careful and complete physical examination of the patient. The results show that a positive fixation reaction is associated in a large majority of cases with a tuberculous lesion that is pathologically if not clinically active, and consequently any patient giving a positive reaction should not be considered free from active tuberculosis without a thorough study.

Stigmata of Predisposition to Bone and Joint Tubercle. W. C. Rivers[2] studied children from various sources subjects of bone and joint tubercle from the Treloar Hospital at Alton, Hants, and the King Edward VII Hospital for surgical tuberculosis, seventy-three patients in the district round Barnsley, and controls of normal school children. He found that in bone and joint tubercle red or reddish hair is nearly twice as frequent as in the ordinary population, that probably

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(2) Brit. Jour. Dis. Child., July-September, 1920.

the tendency to permanent freckling is a little more common in bone and joint tubercle than is normal. As regards dental caries, there is no significant difference between the red-haired children and the others. The author reports seven cases of ichthyosis, in four of whom there were multiple tuberculous lesions. It was found to be at least twice as frequent in children with bone and joint tubercle than in non-tuberculous children.

[The fallacy of such observations is that no account is taken of the number of red-haired and freckled children who remain free from tuberculosis.—Ed.]

Case of Complete Pneumothorax in an Infant, Due to Pulmonary Tuberculosis. This condition is extremely uncommon. G. Bourne[3] reports the case of a boy of 18 months who was admitted with cyanosis, cough and dyspnea. He had measles three months before entrance and since then lack of appetite, constipation, wasting and slight cough. On examination the child appeared extremely ill. There was diminished respiratory movement over the left side of the chest with hyper-resonance and diminished breath sounds. Over the right chest there were prolonged expiration, bronchovesicular breathing and râles. The heart was displaced to the right. Liver and spleen were palpable. Complete left pneumothorax was diagnosed. The child died within twelve hours.

Postmorten examination revealed that the left lung was collapsed, containing a solid mass of tubercles, and a cavity in the apex. The left pleura was studded with tubercles. The right lung contained many miliary tubercles. The hilum nodes were slightly enlarged and hyperemic, not caseous. Liver and spleen contained tubercles. The mesenteric lymph nodes were much enlarged. The infection probably traveled from the mesenteric to the mediastinal lymph nodes and produced areas of caseation along the lymph channels extending to the left pleural surface. It is assumed that during a violent attack of coughing the portion of diseased tissue between a bronchus and the left pleural cavity perforated. This probably occurred three weeks before death, it is assumed from the history of the illness. From the

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(3) Brit. Med. Jour., April 19, 1921.

sudden massive infection of the pleura, general miliary tuberculosis resulted.

Study of Tuberculosis in Infants and Young Children. From April 1914 to April 1920, 8,919 sick children were admitted to the Babies' Hospital in New York. Among them were 4 per cent. who had symptoms of tuberculosis in some form. During these years 2,024 necropsies were performed; 9 per cent. were on tuberculous subjects. This study by M. Wollenstein and R. C. Spence[4] brought out the following facts:

The great frequency of tuberculosis in infancy and early childhood.

The suggestive decline of tuberculosis among the young children admitted to the Babies' Hospital during the last six years.

The greater incidence of tuberculosis of infants and young children acquired by inspiring tubercle bacilli compared with that acquired by swallowing the bacilli with milk or food.

The rapid generalization of tuberculosis in young subjects, the rapidity and degree of generalization being, as a rule, in inverse proportion to the age.

The great frequency with which termination by tuberculous meningitis occurs.

The absence of any case of healed tuberculosis from this series of 184 necropsies on tuberculous children.

[This paper emphasizes the relatively greater frequency of bronchogenic than enteral tuberculosis, and the marked tendency of tuberculous infection in infants to become generalized. These facts have been maintained by all accurate investigators.—ED.]

Heliotherapy of Infantile Tuberculosis. K. Klare[5] reports his treatment of all forms of infantile tuberculosis by means of heliotherapy which he has employed at Scheidegg in the Allgau. He follows Rollier's directions. After open air treatment in the room for from 8 to 10 days, he begins by allowing the rays of the sun to fall on the feet for 5 minutes three times the first day, for 10 minutes the second day and in addition for 5 minutes on the legs so that he gradually works up

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(4) Amer. Jour. Dis. Child., January, 1921.
(5) Kindertuberkulose, Feb. 26, 1921.

to complete raying in twelve days. He endeavors to obtain the action which produces pigment rather than inflammation. Klare emphasizes that he does not consider the sun to be the only curative factor, but that it is the combination of sun and high altitude which produces remarkable results both in pulmonary and in surgical tuberculosis. High altitude has a marked action on hemoglobin, raising it on an average 21.5 points within six weeks. In surgical tuberculosis the fetid pus loses its odor after a few treatments, becomes thin and later serous. Fistulae become less painful, the motility of the involved joints returns, swelling decreases and the bone contours become more sharply defined. Control by Roentgen ray indicates the progress, although the filling out of bone cavities may take a long time. Casts are rarely used in the treatment of surgical tuberculosis. The position is corrected and bandages are held in place by sand-bags. Early exercise after the disappearance of tenderness is employed. The author has used Bier's hyperemia treatment with good success; it is preceded by internal administration of iodine, ten minutes before the hyperemia treatment which is employed three times daily for three hours.

In the treatment of skin tuberculosis, heliotherapy is supplemented with local applications of pyrogallol ointment. Very good results have been obtained. The author treated 100 cases with Much's partigens and states that he finds them a valuable aid of conservative treatment.

In the treatment of bronchial gland tuberculosis, heliotherapy is unexcelled. Rhythmic and respiratory exercises are also employed. In afebrile (even the open) pulmonary tuberculosis heliotherapy was employed without bad results, although treatment must be more gradual than in the surgical form.

The author believes from his experience that heliotherapy represents a therapeutic measure for all forms of tuberculosis in children, which when employed early is not nearly equalled by any of the other forms of treatment.

Skin Tuberculosis and Light. In comparing the various forms of skin tuberculosis in children, W. Fink[6]

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(6) Kindertuberkulose, April 2, 1921.

states that the prognosis of scrofuloderma is the most favorable, while that of lupus is much less so. While the extent of the process is a considerable factor, the author has frequently seen extensive foci yield more rapidly than small scattered foci. He uses light therapy almost exclusively for these patients. Sunlight is preferred but when the sun does not shine lamplight is used. Care is taken that the light is not too strong, inflammation and vesicle formation are avoided. With a reddish brown skin, due to pigment formation and normal filling of the capillaries with blood, the general condition improves. In patients whose skin does not react in this normal way the prognosis for general improvement is also poor.

Local treatment is also employed and at times it is aimed to convert the chronic focus into an acute inflammatory process by the action of the rays. The resulting serum formation contributes to the healing of the process.

For early lupus complete excision is advised. Care must be taken to prevent the formation of a large scar, since recurrence in such a scar is extremely difficult to treat. Operation for scrofuloderma may convert this into a lupus. It is, therefore, better to expose the glands to the sunlight. Every city and every school ought to have sun and light baths, as this treatment is not only beneficial for skin tuberculosis but for all children who are predisposed or in danger of contracting tuberculosis.

Sun Light and Scrofula. Thedering[8] maintains that the term scrofula is still justified for the form which manifests itself in chronic catarrh with dry fissures occurring in children with a family history of tuberculosis; 90 per cent. of all cases of lupus begin, he says, on the basis of this condition. Manifestations of scrofula are also the dry eczema of elbow and knee joint, and certain itching papular and impetigenous eruptions. Besides the general and hygienic treatment of these patients, natural sunlight and quartz light are most important therapeutic agents. Bichloride baths—from

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(8) Kindertuberkulose, April 2, 1921.

1 to 2 grams to from 30 to 50 liters of water appear to have an action similar to the light.

A Method of Determining the Appropriate Dose of Tuberculin for the Individual Tuberculous Child. Failure of tuberculin treatment is probably due, M. Solis-Cohen[9] states, to inability to determine the appropriate dose for the individual patient, which may be one millionth of a milligram in one patient and one-tenth of a milligram in another of apparently the same type, owing to wide differences in tuberculin over-sensitiveness and tuberculin tolerance. The usual method of giving all patients practically the same initial dose does harm to those who should take less and is ineffectual in those who require more. The correspondence between tuberculin over-sensitiveness and tuberculin tolerance suggests the determination of the therapeutic dose for each patient as the amount of tuberculin that gives the minimal reaction when injected in that patient intracutaneously.

The success of this method in children has been demonstrated in nineteen cases reported by this author, in which the initial doses varied from one hundred-millionth to one-hundredth of a milligram and were increased ten times to 120,000 times over periods of from one to twenty-one months, practically without producing an unfavorable reaction in any. A large proportion of the children showed improvement in general condition, reduction of temperature and gain in weight.

RESPIRATORY DISEASES

Empyema in Children. E. B. Hodge[1] emphasizes the frequency and danger of empyema in children; the value of aspiration, not alone in diagnosis, but in treatment preparatory to operation; the consequent increase of interest to the physician in the treatment and greater need than ever for coöperation between him and the surgeon and the greater chance for the patient by reason of an

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(9) Archiv. Pediat., November, 1920.
(1) Ibid., January, 1921.

operation better considered as to time, type, and condition of patient and an improved after-treatment.

Empyema in Children. Report of Sixty-Four Consecutive Cases. Elizabeth Glenn[2] comes to the conclusion that the incidence in males is greater than in females. The left side is more often involved than the right. If the mortality rate for empyema in children under one year be excluded, the death rate is lower in children than in adults. In children under 1 year the mortality in her six cases was 66.6 per cent., instead of 90 to 100 per cent. usually given. In the postpneumonic empyemas, where the patient is operated on within the first week after onset, the average stay in the hospital was shorter and the proportion of cures higher than in those operated on at a later time.

[Clinical experience is not in full accord with these findings. Nearly every clinician has arrived at the conclusion that early operation has its disadvantages and that there is definite value in waiting till the hyperacute symptoms have subsided and the abscess cavity is well walled off.—ED.]

Bronchial Asthma in Childhood. F. R. Mason[3] believes that nearly all cases of bronchial asthma in children are anaphylactic in origin, although influenced by mental state and climatic conditions. He divides asthma into four clinical groups, which, however, merge into each other and are really only degrees of severity:

1. Frequent coughing spells which vary in duration and frequency. This is a very common type in infants.
2. Frequent attacks of bronchitis, not associated with any rise in temperature. These two types are rarely recognized as asthma.
3. True bronchial asthma attacks.
4. Constant asthma. In all cases the essential feature is a recurrence at intervals of difficulty of respiration or cough, independent of any infection of the air passages. Diseases which may simulate bronchial asthma are chronic bronchitis, whooping cough in infants, and reflex causes from mediastinal enlargement, foreign body in the larynx, bronchi, lung, ear and esophagus, and

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(2) New York Med. Jour., Dec. 18, 1920.
(3) N. Y. Med. Jour., Sept. 18, 1920.

possibly worms in the gastro-intestinal tract[?]. Certain phases in the history likely to give valuable information as to the etiology are the period when the first anaphylactic phenomenon developed, the time of the year when the attack occurs, the location of the domicile of the patient, the time of the day when the attacks occur and certain factors in environment, such as the presence of dogs, cats, rabbits, horses, smell of herring, a cold, ipecac, hay, linseed, various foods, certain types of canned foods (depending on the brand), plants, pillows, stuffed animals, and skins.

The author groups the causes of bronchial asthma under the following classifications:

Inspiratory cause: pollens from plants, animal emanations, animal hair or dander, bird feathers and dust from certain drugs.

Injected cause: serums and antitoxins.

Ingested causes and bacterial causes.

The skin reactions are a great aid to the determination of the etiology. Drugs which may be used to give relief are adrenalin, benzyl benzoate, atropine, iodides, nitrite of amyl or nitrite fumes. These measures are only palliative. Results are only obtained by investigating the causes of the anaphylaxis and eliminating the causes found.

THE DUCTLESS GLANDS AND DISTURBANCES OF INTERNAL SECRETION

Serum Concentration and Viscosity of the Blood in Myxedema and the Effect of Thyroiodine. The viscosity of whole blood varies within normal limits and is essentially dependent on the number of erythrocytes and the viscosity of the serum. G. Deusch[4] found it to be either at the upper limit of the normal or increased to 2.3 (relative to aq. dest.) in myxedema. The albumin concentration of the serum was markedly increased in 50 per cent. of the cases. In a few other cases due to hypofunction of the thyroid gland, viscosity and albumin content of the blood were also high. By administering thyroiodine a decrease of viscosity of the albumin con-

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(4) Deutsch. Archiv. f. klin. Med., December, 1920.

tent of the blood, simultaneously with clinical improvement and loss of weight occurred. The increase of the serum concentration in myxedema is caused by increase of the absolute albumin content of the serum analogous to the albumin storage in the tissue. The refractometric and viscosimetric examination of the serum in myxedema affords an approximate and a rapid idea of the albumin metabolism. It is a valuable diagnostic aid, Deusch thinks, in differentiating little pronounced cases of myxedema from clinically similar cases, such as hunger edema.

Hyperthyroidism in a Child. After a brief review of the literature M. H. Frantz[5] reports a case of hyperthyroidism with its symptom-complex appearing in a child of 18 months which may have existed even prior to that time. Due to the residence of the parents of the child in a goitrous district, the mother of the patient suffering from hyperthyroidism, and the mental precocity of the patient, the question may occur as to whether this condition is congenital.

Position of the Diaphragm in Roentgen-Ray Diagnosis of Enlarged Thymus. H. J. Gerstenberger[6] reports the case of a patient, 17 months old who under the fluoroscope and in the roentgenogram showed a wide shadow in the thymic region which, according to present conception, was considered abnormal. This shadow in its most marked form extended both to the right and to the left of the vertebral column, while in its moderately severe form it projected out only to the right. This wide shadow was sharp in outline and had a definite shape, similar to that of a miniature lung, with an angle at the lower, outer, right side which seemingly could not be produced by either the vena cava, or by the auricle, as it extended clearly separated from the heart out into the lung area, and not toward the middle line, as would be the case if a distended auricle were responsible for it. No pulsations were ever seen in the shadow or any part of it, and the shadow was accepted as of thymic origin. The abnormal shadow could be replaced by one of nor-

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(5) New York Med. Jour., Feb. 12, 1921.
(6) Amer. Jour. Dis. Child., June, 1921.

mal size if the patient took a deep inspiration. The abnormal shadow could be brought out in its most marked form by having the patient expire deeply and forcefully. Both observations could be seen with the aid of a fluoroscope.

The diaphragm, as observed under the fluoroscope, rose with the development of the abnormal shadow and descended with the development of the normal. Frequent exposures to the Roentgen ray for a period of over five months did not change the size of the thymus, nor did they influence in a dependable manner the general condition of the patient. The patient improved, while his thymic shadow remained the same. The general improvement is explained by the dietetic changes instituted and the administration of atropine. In producing the abnormal shadow in expiration, the diaphragm seemed to be the most important individual factor, either directly and mechanically by pushing the heart upward and so forcing the thymus in the same direction and also outward when ascending markedly, or indirectly by increasing the intrathoracic pressure to a sufficient degree to move the thymus upward in a mechanical manner; or by retarding decidedly and in forced extreme expiration nearly entirely the venous outflow from the thymus, while still permitting its arterial inflow, and by so creating an acute engorgement and enlargement of the gland, which would cause the above factors to operate even more advantageously. This would explain better than anything else the miniature lung-like development of the shadow under the fluoroscope.

In establishing the return to a normal picture the descent of the diaphragm probably operates by relieving the causative factors indicated above, and so allowing the thymus to descend down toward and over the middle of the heart and to empty itself rapidly following the suction effect of inspiration, especially when deep. The wide shadows in their most marked form appeared on both sides, especially when viewed under the fluoroscope, but more on the right than on the left. In medium-wide shadows only the right was represented. Consequently, it is not justifiable to conclude that a picture showing a shadow limited to the right side comes from a patient who is unable to develop a shadow on the left side as well, if given the proper conditions, nor can it be concluded on the same basis that this shadow on the right side has nothing to do with the thymus gland and has been produced by some other factor such as an enlargement of the vena cava or auricle.

The author concludes that in order to have accurate knowledge as to the actual size of the thymus it is necessary to examine the gland under the fluoroscope and watch its position and condition at the various phases of respiration, especially in the development and at the end of a somewhat prolonged and forceful expiration, and again during a deep inspiration following the type of expiration just described.

If roentgenograms are made, an attempt should be made to get pictures both in deep inspiration and deep expiration. It may be well likewise to attempt first to get a picture while the child is breathing quietly and normally. It must, however, be realized that to procure roentgenograms of the thymus in the different respiratory phases is very difficult, uncertain and time consuming, and it is suggested that the fluoroscope be always used to check the findings of the roentgenogram.

The Present State of Knowledge of the Status Thymico-Lymphaticus and Its Relation to Other Diseases. F. Henke[2] in reviewing this subject points out that even today the question has not been answered whether a constitutional anomaly or a secondarily acquired change is responsible for the enlargement of the thymus and certain lymph nodes. He believes the question may be debated whether deficient, normally sized or hypoplastic organs do not respond particularly easily to slight stimuli with hyperplasia. He differentiates strictly between a status thymicus observed in the newborn and a status thymico-lymphaticus. The former is probably a congenital anomaly, causing symptoms not mechanically, but because of its effect on internal secretion. The author discusses in detail the symptomatic picture of status thymico-lymphaticus, especially its relation to other abnormalities and comes to the conclu-

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(2) Deutsch. med. Wochenschr., Nov. 4, 1920.

sion that it is pathologically, as well as clinically, an important constitutional factor.

Status Thymico-Lymphaticus: Disproportion Between Size of Brain and Skull and Accident. In various necropsies following anesthesia and in three accidental deaths, a disproportion between the size of the brain and the skull was found besides the suspected status thymico-lymphaticus. Culp[3] believes that there is a relation between constitution and accident. Lymphatic children are reported to be slow in thinking. Marked emotional excitement such as is present during an accident increases the circulation to the brain; according to Marchand, an increase of volume up to 200 grams may result. Because of this sudden collection of blood in the veins of the pia, there is increased pressure on the brain which is large in proportion to the skull cavity. This results in a loss of consciousness which may explain the behavior of certain persons during an accident.

Suprarenal Sarcoma of the Robert Hutchison Type. F. P. Weber[4] reports the case of a markedly cachectic and emaciated child of 5 years with enormously enlarged liver and symmetrical swelling and ecchymosis of the eyelids of both eyes, and optic neuritis. The illness had come on three months previously. Examination of the blood revealed an anemia. On necropsy a large irregular tumor was found attached to the upper pole of the right kidney, which had the microscopic appearance of a round-celled sarcoma, originating in the medullary portion of the right suprarenal gland. The liver, ovaries, lymph glands and the orbits and skull showed metastatic growth. The author mentions fourteen cases of this type reported in the literature.

DISEASES OF THE NERVOUS SYSTEM

The Delicate, Nervous and Backward Child as a Medical Problem. Pedology is defined by E. Bosworth McCready[5] as that branch of pediatrics in which the physical and mental defects of child development are especially studied and treated by the physician. The causes of these defects are hereditary or environmental,

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(3) Mschr. f. Unfallhlk. u. Invalidenwesen, 1920, No. 7.
(4) Brit. Jour. Child. Dis., July-September, 1920.
(5) Med. Record, January. 15, 1921.

or a combination of both. The causes of constitutional inferiority are stated by Noble as follows:

(a) Hereditary hypoplasia: Due to defect in the chromosomes of the ovum or the spermatozoon of parents.

(b) Environmental hypoplasia: (1) Due to toxemia in the parent or parents affecting (by poisoning) the ovum, or the spermatozoon, or both—giving rise to a defective (poisoned) impregnated ovum or germ. (2) Due to toxemia in the mother or to local disease in the endometrium, leading to poisoning of the germ, the embryo, or the fetus, or to insufficient nutrition of the developing ovum.

(c) Mixed hereditary and environment hypoplasia: Due to toxemia in the parent or parents, themselves examples of hereditary hypoplasia, before conception; or to toxemia, or to uterine disease, in the mother during pregnancy; or to bad environment leading to disease in post-natal life, in children of parents having hereditary hypoplasia.

Hereditary hypoplasia was formerly spoken of as the hereditary diathesis or dyscrasias, as gout, diabetes, tuberculosis tendency, the diatheses, including hereditary neuroses and psychoses and epilepsy.

Environmental hypoplasia may be general or specific as to organ or systems of organs, or diathetic in type.

Among the gross somatic manifestations of hypoplasia may be found abnormalities in size and shape of the head, malformations of the ear, anomalies of the eyes or lids, malformation of the nose and face, of long bones; and umbilical hernia. Incidental variations in development may be anatomic, physiologic or psychic. The treatment of constitutional inferiority may be divided into prophylactic, hygienic, medical and educational. Accordance with the rules of hygienic living on the part of prospective parents will do much toward insuring the integrity of individual germ cells. After conception, the burden of responsibility rests upon the mother. The writer is convinced that the malnutrition and toxemia incident to gastro-intestinal disturbances in infants constitute one of the most frequent causes of constitutional inferiority. It may also be a true deficiency disease due to a diet deficient in vitamines or other food accessories necessary for growth and development. Many cases of subnormal development are due to an impoverished blood-supply which may be the result of an excess of carbohydrates in the diet. Next to diet, fresh air and exercise have an important place in the prophylactic and hygienic management of the hypoplastic child. An important requisite to effective treatment is the removal of possible sources of focal infection and reflex irritation. Practically every organically inferior child presents symptoms which are referable to the endocrine system, to the vegetative nervous system and to the blood-making apparatus. The educational management of children of this type is practically synonymous with the current concept of the term mental hygiene. The country is the ideal place to carry on the education of the hypoplastic child.

The Nervous Child. S. Blanton[6] states that the threshold of irritability of the nervous system in childhood is very low, and the whole system may be compared to a new telephone system where the connections have not yet been made good, wires are not entirely straightened out, and the operators are untrained.

Vomiting, especially of a recurrent or cyclic character, may be caused by a purely emotional disturbance, without the presence of acidosis or any infections or organic disturbance and in such cases no diagnosis is complete which does not contain, in addition to the study of the organ and the functioning of the organ, the functioning of the personality as a whole, and of the habit reactions, and emotional disturbances that may be causative factors. Children of neurotic parentage should be taught regular and healthy food and sleep habits if later trouble of a serious nature is to be avoided. These neurotic children are found to have abnormal food habits. A child who does not adapt in the food sphere will usually be found unable to adapt at home and on the playground. Above all will they be found in a high percentage among those who have failed to adapt in the functioning of the speech organs.

Children of subnormal mentality frequently suffer from enuresis, in fact it is rather rare to find a child of this type in whom nocturnal enuresis is not somewhat frequent. It is maintained by some investigators that the tone of the smooth muscle comprising the sphincters, is largely maintained by the pituitary and that enuresis is due to hypopituitarism and that small doses of the

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(6) Wisconsin Med. Jour., December, 1920.

entire pituitary are efficacious. Blanton has been able to obtain fair results while giving this medication, but, as at the same time the entire routine and regime of the child was changed, he does not feel certain as to the factors that brought results.

Very good results have been obtained by some recent investigators in giving minute dosages of atropine sulphate. The dosage was as small as one one-thousandth and this minute dosage acted as a stabilizer of the autonomic nervous system. More often it will be found that in this way the child dominates the environment; it ties the child to his infancy and helps to continue the period of supremacy.

Unconscious mechanisms are only accentuated by attempts at conscious control. Myoclonia in children, with its many subdivisions is very likely to be diagnosed as chorea, as are also the habit choreas, which rarely result from a true chorea. The myoclonias are relatively ineducable, the tics and habit movements somewhat more hopeful, whereas the somatic paranoid insufficiency tics in which children break into foolish habits of various sorts when life becomes too difficult for them, are indicators of possible serious oncoming disorders of adjustment.

Children should be able to communicate by means of spoken language at the age of three. Something is radically wrong either in the intelligence or adaptive life if this is not so. There are three types of stuttering, the hysterical type, the psychoneurotic type and the neurotic type.

Hysteria in the Nursery and in Warfare—A Comparison and a Contrast. H. C. Cameron[7] makes a comparison between the war neuroses and little upsets of nursery life such as habitual vomiting or constipation or refusal to eat. He has been impelled by a desire to show that studies such as those carried on so successfully at the Seale Hayne Military Hospital are not divorced from ordinary practice or without bearing upon it. They are valuable, not merely because they record the psychologic phenomena of warfare, but be-

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(7) Archiv. Pediat., March, 1921.

cause they make applicable to all forms of practice the experience gained from the unusual opportunities which the war provided. Here, as in many other branches of pediatric study, light may sometimes be shed by approaching the subject from the surer vantage ground of adult medicine in which, it may be, that etiology is less obscure and symptomatology more sharply differentiated. It is clear that the mind in development and in disturbed states in later life is prone to react similarly.

Umbilical Colic of Friedjung in Older Children. Friedjung described in 1904 a typical form of hysteria in older children from three to ten years, which is characterized by sudden attacks of abdominal pain in the neighborhood of the umbilicus. A. Stern[8] finds that this pain lasts as a rule from a quarter to half an hour and during this time the child feels ill, becomes pale, complains about a very severe pain in the upper abdominal region, puts its hand to the stomach and afterward appears to be weak for the whole day. These attacks repeat themselves at irregular intervals and last sometimes through months and even years. Bowel movements are normal. The Chvostek facial symptom and taches cerebrales, and psycho-pathologic signs are often present. Vomiting during the attack is rare; there is no fever, and all these patients show a hyperesthesia, especially of the cervical and thoracic vertebrae and of the skin of the abdomen. The disease is, undoubtedly, a disturbance of the nervous system and can probably be classified in the hysterical group. The final prognosis is good. Friedjung suggests giving these children small doses of tincture of valerian and impressing on them that the medicine given will cure the attacks. Stern reports three cases of this disease. One child had an umbilical hernia; the attacks disappeared after a truss was applied.

[The diagnosis of this form of abdominal pain is attended by considerable risk. Every form of organic lesion should be considered and the diagnosis should be arrived at by a process of painstaking exclusion.—Ed.]

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(8) Jour. Med. Soc. New Jersey, August, 1920.

Reflexes in Early Infancy. Sixty-nine infants were examined by C. W. Burr[9] at the Children's Hospital and the Philadelphia General Hospital. The ages varied as follows: 1 hour or under—three; between 1 hour and 24 hours—eleven; 1 to 7 days—twenty-eight; 8 to 30 days—fifteen; 31 to 90 days—twelve. All the children were free from nervous disease, except one who had a congenital peripheral facial palsy. Burr found that the deep and superficial reflexes (*i. e.*, knee, Achilles, chin, plantar, abdominal) may be present at birth but the absence of one or all in early infancy does not indicate disease. The plantar jerk is very variable. It may be absent up to the third month or longer, or there may be extension or flexion of the toes, or at one time there may be one movement, at another the other. Most frequently there is extension. The movement may be rapid or deliberate. The Achilles jerk is very frequently absent at birth. How late in life it may appear is unknown. Sometimes the abdominal jerk can be obtained only on stimulating the lowest third of the muscle. Whether the occasional absence of the knee-jerk in healthy adults (1 in 500) is congenital or the result of disease in early life can not be decided in the abscence of a complete medical history. Diphtheria may permanently abolish it without persistence of other signs of nervous involvement. When the reflexes appear after birth, their appearance does not occur in any regular order.

Conditional Babinski Reflex. F. Resek[1] was able to elicit the Babinski reflex in a 5 year old child who had had infantile cerebral paralysis with resulting paresis and pyramidal involvement, by first stroking the plantar surface and subsequently simply imitating this motion without touching the foot. The same result was obtained when the faradic current was applied. After applying it in the usual way and obtaining the reflex he approximated the cathode, and observed both dorsal flexion and fan position of the other toes. This is of a similar nature to the secretion of saliva following the offering of food in Pawlow's experiments on dogs. Ham-

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(9) Amer. Jour. Dis. Child., June, 1921.
(1) Zeitschr. f. Kinderheilk., vol. 29, Nos. 1-2.

burger observed the cremasteric reflex in similar manner. The conditional Babinski is evidently a defense reflex.

Eosinophilia Occurring in Chorea. A series of twenty-nine girls and eleven boys from 7 to 14 years were studied by H. C. Berger[2] paying attention principally to the blood. He used Wright's stain and calculated the percentage of eosinophils from a count of 900 blood cells. The highest count was 26 per cent., the lowest 0, with a general average of 7.6 per cent. The rise and fall in these counts could not be connected with the clinical progress of the case. The author questions what bearing this eosinophilia may have on the etiology of chorea. He thinks that if chorea is the result of a general bacteremia, it acts on some body structure, possibly one or more of the endocrine glands, through a toxin or otherwise, rather than that the infection is a cerebral irritant *per se.* Such a course of action might also account for the eosinophilia present, through sensitization to a toxin, or to the superabundance of some secretion which is normal and hence gives no reaction in smaller quantities.

The Significance of Xanthochromia of the Cerebrospinal Fluid, with Report of a Case in a Premature Infant. I. A. Abt and I. H. Tumpeer[3] report this case because of the yellow coloration of the spinal and ventricular fluid. The infant was 37 days old at the time of death and was of eight months gestation. Interest also attaches to this case because of the occurrence of bronchopneumonia and pyelitis.

Xanthochromia is found in the complete syndrome of Froin and in the incomplete syndrome of Nonne. Froin's syndrome includes massive coagulation, while Nonne's syndrome includes increased globulins but not massive coagulation. The importance of cell increase is mentioned by some authors and ignored by others.

Considering xanthochromia or yellow color by itself is the simplest way of elucidating the subject. It is most frequently found in cases of tumor, inflammation or trauma cutting off of part of the spinal canal. The cul-de-sac so formed usually contains a yellow fluid which

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(2) Amer. Jour. Dis. Child., May, 1921.
(3) Ibid., September, 1920.

coagulates *en masse*. The pigment comes from the blood ultimately. In addition to the process of transudation, which occurs in a cord compression, it is readily seen that any condition which permits red blood cells to escape into the spinal fluid might produce a yellow color when the red cells have been dissolved and the hemoglobin freed.

The globulins are always increased in a yellow fluid, whether massive coagulation occurs or not. It may be due to transudate in the case of a tumor pressing on the cord; exudate in the case of a meningeal inflammation, and hemorrhage in cases due to trauma, inflammations and tumors.

Increased cell count occurs in cases of meningitis, and is also found in cases of tumor and hemorrhage. In the last case, the presence of red cells usually excludes other conditions, although blood may be present as a concomitant finding in tumors and in meningitis.

Pellicle formation is of little importance, is usually found in meningitis, and has been reported in a case of tumor without meningitis.

Where the process has been of short duration and where the compressions have not been sufficient, massive coagulation may not occur. Many writers state that Nonne's complete syndrome was merely a precursor of Froin's complete syndrome. Some cases of Nonne's syndrome probably never reach Froin's stage. Similarly, conditions causing hemorrhage may never give sufficient plasma and fibrin to cause coagulation.

Another class of cases causing a yellow spinal fluid is that type associated with red cells in the fluid. Many consider this a separate syndrome, and apply the name erythrochromia to this condition. No hard and fast line can be drawn between yellow fluid on the basis of the presence of red cells. The other differences which are stated as distinguishing erythrochromia from xanthochromia are proved to be not differences at all, because such properties of variability of a single fluid as regards color and globulin content apply just as much to one as to the other.

The case reported is that of a child brought to the hospital as a feeding case. About the fourteenth day the temperature rose to 106° F. and the child was seized with severe convulsions. The urine showed many pus cells, and, upon examining the lungs, patches of bronchopneumonia were found. The convulsions, urinary and pulmonary findings persisted until the end. The anterior fontannelle was tense and bulging. On the thirtieth day, spinal puncture yielded 4 c.c. of distinctly yellow fluid. The fluid was clear but the first 2 c.c. yielded a filmy pellicle. The second tube, containing 2 c.c., did not change. Three days later, the right ventricle was punctured and 20 c.c. of yellow fluid were removed. In both specimens of fluid there were red cells, increased globulin, and increased cell count, most of which were polymorphonuclears. The child died on the thirty-seventh day and autopsy showed a fibrinous, hemorrhagic meningitis and encephalitis. There were subpial hemorrhages, marked internal hydrocephalus, subacute pyelitis, and bronchopneumonia.

Two other cases are quoted from the literature in which ventricular punctures were performed. In one of these, the fluid was yellow and the condition was due to a tumor of the pineal gland. In the other, the fluid was colorless, and the yellow color of the spinal fluid was due to a tuberculous mass at the foramen magnum. Previous to this case, the youngest case on record of xanthochromia of the cerebrospinal fluid occurred in an infant of 9 months. This case was one illustrating the second type of xanthochromia. Both the spinal and the ventricular fluids were yellow and both contained red blood cells. It should be noted also that in Abt's case the child was an infant of eight months' gestation, who lived thirty-seven days, and who also had bronchopneumonia and pyelitis.

Diagnosis of Motor Disturbances in Children. In an address read before the Brooklyn Pediatric Society, J. L. Joughin[4] discusses tremors, athetosis, chorea and tics and convulsions as they occur in infancy and childhood. He classifies tremors as: (1) physiologic in cold, over-fatigue and emotional stress; (2) hereditary neuropathic tremors diagnosed on the basis of the defective heredity, the fact that it is the sole symptom,

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(4) Archiv. Pediat., May, 1921.

and its progressive course and marked resistance to therapy; (3) tremors occurring in the neuroses including hysterical and epileptic form; (4) tremors in organic diseases of the nervous system, such as hemiplegia, brain tumor and lethargic encephalitis; (5) tremors in intoxications: alcohol, mercury and lead tremors are rare in childhood, but tremors from excessive tea or coffee are not uncommon.

Athetosis most commonly develops following an infantile hemiplegia. It never regresses and is uninfluenced by treatment. Chorea and tics may resemble each other and must be differentiated.

The author discusses the diagnosis of convulsions of uncertain etiology. Those occurring soon after birth are due to some cerebral injury in the majority of cases. Convulsions after three months up to two and three years are usually due to spasmophilic diathesis, though this must be differentiated from epilepsy. This is best done by means of the electrical reaction. After the age of three years epilepsy and hysteria are the most frequent causes of convulsions and must be differentiated from each other.

Juvenile Tabes. From a review of the literature and a study of his own cases, a typical one being reported, C. Rosenheck[5] arrives at the conclusions that juvenile tabes may be considered a distinct clinical entity in view of the long-accepted dictum that adults alone were subject to the disease. He does not deny that the creation of separate entities in a disease that affects both young and old may be justly criticized as being clinically confusing and scientifically unsound, but in view of the rarity of its occurrence and the special characteristics of the affection in the young, juvenile tabes is deserving of special recognition. Juvenile tabes is the result of an hereditary syphilitic infection in the great majority of cases. An insignificant number of cases are due to syphilis acquired during infancy. Its symtomatology differs in no way from that of the adult type, but special characteristics in its onset and course are worthy of note. Early visual difficulties proceeding to blindness and optic atrophy are characteristic of fully 40 per cent. of the cases. Lancinating pains, ataxia, and visceral or vesical disturbances affect only a small number. Trophic disorders are absent. Females are particularly vulnerable to the affection; as twice as many girls show the disease as boys. The ratio in the adult type is placed as ten men to one woman (Gowers). The prognosis is excellent for life, but extremely poor for vision.

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(5) Jour. Amer. Med. Ass'n., Feb. 26, 1921.

Unusual Case of Myelocele. A. J. Cokkinis[6] reports the case of a male infant one hour old with a myelocele in which life was prolonged for twenty-three days. The baby was well-nourished, of good size, with a well-shaped head, and presenting no evidence of hydrocephalus.

The lower limbs were held rigidly flexed to a right angle at the hips, and rigidly and completely extended at the knees. The legs resisted straightening, and were paralyzed, wasted and, so far as could be made out, anesthetic. There was double talipes equinovarus, the varus element markedly predominating, with a well-marked crease on the soles, corresponding to the transverse tarsal joint. There was a large, raw, circular area, somewhat depressed, and corresponding to a deficiency in the neural arches and failure of closure of the neural groove, opposite the lower three lumbar and upper two sacral bodies. The open spinal cord was seen in the middle line at the upper part of the defect, while the nerves of the cauda equina could be distinguished in the lower part. The myelocele narrowed and deepened as it was traced upwards into the funnel-shaped termination of the central canal. Cerebrospinal fluid was constantly, though slowly, dripping out of the apical opening, bathing the raw area, and then running in drops over the buttocks. The surrounding skin was rendered as far as possible aseptic, and a dressing applied. The next day the flow of cerebrospinal fluid was freer, and some congestion developed round the myelocele. During the first week the child's condition remained good. The raw area gradually contracted down and became deeper, while the inflammatory redness subsided. The author has been unable to trace a single case in which the duration of life exceeded a period of three days.

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(6) Brit. Med. Jour., March 12, 1921.

Notes on Mongolism. Forty-two cases of mongolism seen at the Hospital for Sick Children between 1912 and 1916 are analyzed by H. Thursfield[7]. He was able to trace twenty-five of these. He could find no corroboration of the current statement that the mongol is apt to be the last-born child of a long family or that the mother is near the end of the child-bearing period. Two-thirds of the children were born of mothers under 35 years of age; nineteen of the mothers had miscarried at some time in their pregnancies, many of them more than once; only two of the mothers were delivered instrumentally. On the whole there was no evidence to connect the advent of the mongol with any obvious defect of health during pregnancy, nor did there appear to be any evidence of the influence of syphilis or tuberculosis. In six cases, the interval between the birth of the previous child and the mongol had been from five to nine years. A cardiac defect was noted in seven of the forty-two patients, nystagmus in four, cataract, accessory auricle and webbed toes in one. Fissured tongue is not usually marked until the second year. Of the twenty-five patients traced, fourteen had died, the causes of death being chiefly broncho-pneumonia and diarrhea. The oldest survivor was fifteen years old, the youngest six. None of the eleven patients seen alive showed any tendency to become normal. The most progress both physically and mentally was shown in a child who had received thyroid extract throughout the whole period. Thursfield believes that all these patients derive benefit from thyroid. It improves speech, general intelligence, obedience and even temper.

Etiology of Mongolism. A. Dollinger[8] studied twenty-four cases of mongolism but was unable to confirm Stöltzner's assertion that the mothers of mongols give history of signs of hypothyrodism during pregnancy, such as lack of appetite, obstipation, marked gain in weight, hypohydrosis, fatigue. In the majority of cases he found just the opposite. He was able, he states, to confirm the assumption that late births were frequent among mongols. Exhausting conditions such as lues,

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(7) Brit. Jour. Child. Dis., January-March, 1921.
(8) Zeitschr. f. Kinderheilk., January, 1921.

tuberculosis, neuropathy are of no significance. The average age of the parents is higher than the ordinary figures. Preference for music was found in several cases. Growth shows retardation even at birth, but usually disappears later. The author also noticed a striking increase of cases recently.

The Brain in a Case of Mongolian Idiocy. The anatomic findings so far usually were those of developmental retardation. O. Cozzolino[9] reports the case of a 21 months old child with typical mongolism who died of marasmus. Microscopic examination of the brain revealed less than normal weight, asymmetrical hemispheres, subnormal development of frontal and fronto-parietal area, lessened thickness of the cortex, reduction of the number and dimensions of the convolutions, and depressions in the cortex. There were signs of regression and developmental retardation such as inferior development of the frontal convolution, ethmoidal prominence on the orbital surface of the frontal lobe, and extension of the parieto-occipital sulcus to the external surface of the hemispheres. Thus the brain had the appearance that would be expected with the lack of the higher psychic faculties, especially defective development of the pallium. The author observed twenty-three cases of mongolism, eighteen in males, five in females, from 4 months to 10 years of age. In one case there was a mongol spot, in one a sister was also mongoloid, in one there was a congenital heart lesion; in one hypothyroidism. Of seventeen cases, fifteen showed dystrophic changes of the eye-grounds.

Blood Picture in Mongolian Idiocy. Gertrud Nadolny and M. Weinberg[10] report the result of their studies of the blood picture of 10 mongolian idiots at the age of 4 months to 10 years, comparing them with the normal picture as determined by a number of authors. They conclude that the blood picture of mongolian idiocy corresponds to the picture of the normal child from birth to the age of 10. The polynuclear neutral leukocytes were found to be at the upper limit of the normal values. Lymphocytes were normal. Of the eosinophiles, the

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(9) Instit. d. clin. pediatr. univ., Pediatria, Jan. 15, 1921.
(10) Zeitschr. f. Kinderheilk., ~ol. 29, Nos. 1-2.

mononuclear and transitional forms tend to increase. The authors were not able to demonstrate any relation between the blood picture of the mongol and thyroid myxedema. The blood picture indicates the probability that this disease represents a congenital malformation of unknown origin.

Amyotonia Congenita. N. O. Pearce[1] defines this condition as a disease beginning at or before birth or in early infancy, probably due to a congenital developmental defect of the lower motor neurons and of the voluntary muscles. Clinically, it is characterized by weakness, hypertonia and quantitatively diminished electrical response in the muscles, usually without disturbance of sensation or mentality.

Of the five cases reported in this paper, the first is of interest largely because of the classical symptomatology and the results of the exhaustive metabolism study carried out. The second and third cases and the fourth and fifth cases are believed to be the first authentic instances reported of twins suffering from the disease. Literature reveals only one other instance in which twins are mentioned, a case reported by Reiner, in which one twin died intra-partum.

In all five cases, the symptoms were present to a more or less degree since birth, a fact noted in the majority of the cases previously reported. The Wassermann reaction was negative in each case. The von Pirquet reaction was negative in all five cases. The question of heredity has been raised by Faber who pointed out familial occurrence in three instances. In the cases of the twins the older brother did not walk until 2½ years of age, and in another case a younger child died in early infancy from some unexplained condition, while the history of extreme nervousness and tremor of the hands in the mother is also suggestive. Relative to the analogy between this condition and mongolism as representative of reproductive exhaustion, it was found that in one case the mother was 34 years of age and this was her first conception after eight years of married life. In the cases of the twins, almost seven years had elapsed since the birth of an older child.

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(1) Amer. Jour. Dis. Child., November, 1920.

In the metabolism studies of one case, blood **analyses** made at the commencement of this experiment showed the following results:

Creatinin, 1.50 mg. per hundred c.c. of blood.
Creatin, 5.45 mg. per hundred c.c. of blood.
Calcium, 7.10 mg. per hundred c.c. of blood.
Urea nitrogen, 3.50 mg. per hundred c.c. of blood.
Blood sugar, 14 per cent.

The low urea figure may be of some significance. The significant facts, most of which suggest protein decomposition, as demonstrated by a chemical study of this case are a lowered creatinin excretion, in addition to the excretion of creatin on a low protein diet; a normal uric-acid excretion, therefore no nucleo-proteins broken down; an increased rest nitrogen accompanied by an increased neutral sulphur and a normal phosphorus excretion, therefore no bone disintegration.

Report of Cases of Amyotonia Congenita. J. Popper[2] adds three cases of this condition to the 129 so far reported in the literature. They presented the following symptoms and signs which are more or less characteristic of the disease:

Disability of the lower limbs.

Inability to sit upright was presented by the two older children. It is due to involvement of the muscles of the back and those of the pelvic girdle.

The intercostal muscles were involved in two of the cases.

Absent knee-jerks and other tendon reflexes; lessened irritability to the galvanic and faradic current.

Mental deficiency was noted in only one of the three cases which coincides with Fáber's figures of 22.2 per cent. of the cases reported.

Contractures have been reported in 81.8 per cent. of the cases.

Pad feet were present in all three cases.

Convulsions are not common, they were present in one of the three cases.

Radiography of the long bones shows a thinning of the medullary substance.

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(2) Archiv. Pediat., May, 1921.

Faber believes that the primary lesion of amyotonia congenita is a congenital hypoplasia of the lower motor neuron. So far no recoveries have been reported. The patients die of intercurrent diseases. Treatment appears to be of no avail.

Polyneuritic Syndrome Resembling Pellagra-Acrodynia. Seen in Very Young Children. A. H. Byfield[3] reports that during the past five years there have appeared in his clinic seventeen patients, all under 4 years of age (five of them being less than one year old) who have manifested a group of signs and symptoms out of the ordinary. The resemblance of their malady to pellagra was striking, but so many points spoke against such a diagnosis, that it was necessary to think of the presence of some other disease.

The disease picture was a complex one, the nervous system and the skin being most involved, while the respiratory tract and the digestive tract appeared to be less affected. On the part of the nervous system the changes were chiefly sensory or trophic in character. Alopecia, pulling out of the hair (trichotillomania), falling out of the teeth with only slight involvement of the gums; photophobia, and in one case double neurokeratitis; changes in the nails, and reddening of the tongue were seen. Paresthesia of the toes and feet, and of the fingers and hands was another constant and often most distressing symptom, leading to rubbing, scratching and even to chewing of the extremities. A diminution in cutaneous sensibility to pinpricks was made out in some of the cases but this seemed not to be a constant finding, due possibly to the difficulty of making accurate observations in individuals so young. The reflexes were diminished in almost all cases, absent or increased in some; but the severity of the disease and the degree of loss of reflexes did not necessarily coincide. In the more severe cases, and even in the mild ones, dulness and apathy, alternating with extreme restlessness and sleeplessness, and in one instance, delirium, were observed. In a clear cut case the patient would often adopt a characteristic posture, either lying on the side, rubbing the hands or feet, or crouching with the head burrowed into

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(3) Amer. Jour. Dis. Child., November, 1920.

the pillow. In few diseases seen by the author has a clinical picture of such intense wretchedness been presented.

The skin manifestations were most uniform, and were rather definite so far as the fingers and toes were concerned—less so on the trunk. A symmetrical involvement of the fingers and toes, recurring at intervals of a fortnight or so, or even tending to be more or less constant, was one of the most striking characteristics of the trouble. With the hands and feet cyanotic and cold, especially when the temperature of the surrounding atmosphere was low, there appeared a non-confluent erythematous rash, most marked at the tips of the fingers and gradually diminishing until at the region of the wrist it had quite faded away. In some of the cases a small number of fine papules rose from these areas of erythema. Confluent erythema was the rule on the distal phalanges. Desquamation, most marked at the tips of the fingers and toes, growing less toward the region of the wrists and ankles, was often present. The feet were only slightly less involved than the hands. There never was observed anything like the clear-cut line of demarcation between affected and untouched skin as in pellagra. When the thorax or the proximal portions of the arms and legs showed skin manifestations, they consisted either in a morbilliform breaking out or in bullae—the latter being seen only in very severe or advanced cases.

Pustules were uncommon although in one instance death took place from deep phlegmon. When an eruption appeared on the body it was usually accompanied with paresthesia, and in one instance at least, it was so severe that the possibility of a prurigo ferox was considered. With the passing away of the body eruption, pigmented spots were sometimes left. In two of the cases the cheeks and the tip of the nose were involved. The buttocks occasionally showed some skin changes but the region of the crotch was usually spared. The back of the neck was never seen to have any localized breaking out or scaling as in pellagra. The skin eruption was at times of short duration. In three of the cases the disease ran a course without more than the initial erythema which had all but disappeared by the time the child came to the hospital, although the systemic manifestations were still present in marked degree. Some desquamation about the finger tips was the only evidence of a previous skin affection.

An extreme and obstinate anorexia was a prominent part of the disease picture. In only one instance was diarrhea present either before or after admission to the hospital. Vomiting was never found or complained of before admission. A marked degree of emaciation was almost invariably present in those children who had been ill for several months before being brought to the hospital. Many of the patients suffered from extreme thirst. Unusual sweating was common in the well-advanced cases. Frequency of urination was an almost uniform symptom and this was probably accompanied with distress, as many of the children kept crying their desire to empty the bladder. Involvement of the genito-urinary tract was manifested by the frequent presence of pyelitis, though this was never extreme and usually yielded to treatment.

The severity of the disorder varied. Two of the patients seen in the beginning of the study (summer of 1915, winter of 1916) died because the author seemed unable to arrest the advance of the morbid process, but it should be noted that forced feeding was not tried in these cases. The cases which were seen in the last three years seemed to be milder than those seen earlier. Several of the cases were very mild and yielded to symptomatic and expectant treatment. Duration of the trouble varied from two to eight months.

Laboratory findings showed a certain uniformity and of these the leukocyte count was especially noteworthy. With the exception of one case in which only 9,000 leukocytes were found, the number ranged from 11,000 to 30,000. In the differential count, however, there was no corresponding increase in the polymorphonuclear cells, an average of 65 per cent. being observed. Eosinophiles, up to 2 per cent., were sometimes encountered due possibly to the skin involvement.

The stomach contents were twice analyzed and in both instances a practically normal amount of hydrochloric acid was found. Acetonuria was a rather common finding. This was in all probability due to the state of undernutrition produced by the marked anorexia. Pus cells were frequently found in the urine, but this certainly could not be regarded as an essential part of the disease picture. The spinal fluid occasionally showed a slight increase of globulin but the cells were not abnormally increased. The Wassermann test was uniformly negative. From these findings it seems probable that there is a primary disease of the nervous system.

The effect of food on the course of the disease was studied in those patients who entered the hospital, more especially in the more recent cases. A corrective diet, complete in every respect, so far as the author knows, supplying an adequate number of calories, sometimes introduced by gavage, was given. The benefit from this treatment was unmistakable, although cure was not always brought about quickly; for the paresthesia and weakness were most persistent. The improvement by feeding, most prompt in mild and less well-advanced cases, was the only evidence of a possible relationship between food and the disease. The author was impressed by the fact that respiratory infection must play a prominent part either as a primary or secondary cause of the trouble.

A postmortem examination was made in one case, that of a child suffering with an advanced pulmonary tuberculosis. In this case, besides the extensive changes in the lungs which had no direct bearing, gliosis about the central canal was present in the spinal cord. Of the anterior horn cells occasionally one or more, situated proximal to the anterior commissure, was found to be of poor staining quality. The dorsal columns did not show the effects of the disease.

The sciatic nerve showed edema and swelling of the myelin sheath, as well as edema of the connective tissue about the nerve fibers. The same variation in the size of the fibers was seen in the posterior roots in the lumbar cord.

In no case was there any evidence of involvement of the parents with this disease or anything resembling it. In one case strikingly benefited by tonsillectomy, a brother, 1½ years of age, died of what was undoubtedly this same affection.

From descriptions of the disease there appears to be a marked similarity between the author's cases and acrodynia.

In the treatment of this condition gavage should be resorted to without hesitation where milk or other proper nutriments are refused. The acetonuria demands treatment with carbohydrates and moderate reduction of fats, but as this metabolic disorder is usually due to starvation it disappears in a short time after forced feeding. The disease seems to be increasing. According to the histories, infection rather than dietary error seems to play the more important rôle as an exciting factor. It is suggested that the disease described is a post-influenzal radiculitis or sensory polyneuritis.

[An interesting group of cases. Individual cases and groups should receive continued investigation and study, particularly from the standpoint of nutrition, pathology and clinical course. The gliosis about the central canal in Byfield's case is significant.—Ed.]

Case of Raynaud's Disease. The case of a female infant of 6 weeks, who was bottle-fed and did not gain on its feedings and soon began to appear undernourished, is reported by P. S. Potter and A. C. Silverman.[4] Both hands and feet began to look blue and felt cold, and the baby appeared to cry when these were handled. At first the extremities were pale and the blueness would pass off after a while or change to a reddish discoloration, but for about a week before admission the extremities were almost constantly purplish. A few days before admission the tip of the right ear turned black. At the same time the child began to take its feeding poorly. There was no fever at any time. The temperature appeared to be almost constantly subnormal.

Physical examination revealed a fairly well-developed but marantic female infant, looking pale and very feeble. Weight, 6 pounds, 2 ounces. Rectal temperature 96.8° F. Both hands from wrists down and both feet below the ankles were cyanotic, purplish blue, cold. The anemic pressure trace disappeared slowly. On the

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(4) Archiv. Pediat., December, 1920.

pad of the left great toe was a small black area about 3 mm. in diameter. The tip of the right ear showed a black area of 1 x 0.5 cm., surrounded by a larger area of black-blue cyanosis. The tip of the left ear was markedly cyanotic. The skin was otherwise pale, clear, somewhat bluish or rather ashen gray.

The child began to look moribund shortly after admission despite efforts at treatment, and died on the third day. During this time the extremities remained purplish, changing at times to a slightly brighter or darker hue. Before death the skin in front of the right ear also became cyanotic.

On necropsy no gross lesions were found aside from the gangrene. Microscopic sections of the tissues were examined especially the blood-vessels, and long strips from the dorsalis pedis artery and vein were carefully examined. The gross and microscopic appearance of the vessel walls was normal. The available literature would seem to indicate that this is the youngest case of Raynaud's disease on record.

Case of Purpura with Symmetrical Gangrene of the Fingers. The case of a boy 30 months old who had an attack of purpura lasting four weeks is reported by M. Michael.[5] After a remission of two weeks a second attack occurred, which was followed by another remission of two weeks when the first phalanges of all the fingers of the right hand and the thumb, index, middle and little fingers of the left hand began to look dry and gradually turned black. The child was brought to the hospital five months after the onset of the disease. On physical examination fading purpuric lesions and an irregular moist gangrenous area were observed on the left thigh and the right buttock. After remaining at the hospital for nineteen days the child's condition greatly improved, the purpura practically disappeared, the fingers remained unchanged and subsequently the gangrenous area dropped off, healing smoothly. The author concludes that an infectious obliterating arteritis was responsible for the gangrene of the fingers, the infection being the same as that which caused the purpura. No similar case

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(5) Amer. Jour. Dis. Child., August, 1920.

of symmetrical gangrene of the extremities associated with purpura is found in the literature.

DISEASES OF THE URINARY ORGANS

Intermittent Albuminuria in Children. This condition is well known, and has been described by several names, of which cyclic, postural, orthostatic, lordotic, functional, and physiologic are the commonest. Albuminuria is present only if the patient is up and about, and is absent if he remains in bed. On examining the urine of 397 boys between 8 and 14 years of age at Vauxhall Street Elementary School, F. Moor[6] found albumin in ninety-one of the specimens (that is, 23 per cent.). It is generally assumed that albuminuria is commoner in boys, but there does not seem to be any evidence on the subject; out of sixteen cases of intermittent albuminuria studied at the Evelina Hospital for Children, only four were in boys. In six cases in which the author made special note of the spinal curvature, lordosis was present in four and absent in two.

Several theories have been advanced to account for this condition, but each of them has the disadvantage of not explaining all the cases; the following are some of the best known:

1. That it is due to congestion of the kidneys, either by pressure on the renal veins or from some vasomotor abnormality.
2. That it is due to diminished coagulability of the blood, and is related to chilblains and urticaria, and may be cured by administration of calcium lactate for a few days.
3. That it is an early manifestation of tuberculosis.
4. That it is one of the neuroses of childhood.

The amount of urine passed by two children admitted as in-patients to the Evelina Hospital was found to be normal, more being secreted by day than by night. Many cases occur without symptoms. The patient generally cries when examined, and whimpers a great deal at home; he is easily tired, and prefers sitting down to playing about.

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(6) Brit. Med. Jour., May 7, 1921.

The children are asthenic and their pupils are unusually large; beyond this nothing was constantly found among the sixteen cases at Evelina Hospital. The heart was enlarged in two cases only and the exercise tolerance was normal in the four cases which were tested. The lungs presented abnormal signs in six cases, but none of these could be labeled phthisis. The blood-pressure was found to be high in some cases—and low in others. In most cases albuminuria was the only abnormality.

The urea concentration test was carried out on seven patients. In every case the renal efficiency was normal, both when albumin was present and when it was absent.

Prognosis of Nephritis in Childhood. This study was undertaken by R. F. James[7] to determine how many patients who had had acute nephritis recovered entirely, how many developed the chronic type, the present condition of the chronic type and the ultimate prognosis. His examination of seventy children who had had nephritis in the Children's Hospital of the Harvard University Medical School included the cardiovascular system, hemoglobin, urinalysis, present health of the child, record of the patient's condition while under treatment and the etiology. This study led him to the conclusions that in acute nephritis the greater percentage of patients recover absolutely. One or several negative urinary examinations do not indicate recovery, until after the child has lived under ordinary environment and on a regular diet for a considerable period. The prognosis in the acute exudative type, with edema and a diminished urinary output is less favorable than in the acute hemorrhagic type without edema. James' statistics show that only 13.3 per cent. of the sixty-seven acute cases developed a chronic type of the disease. There is no specific guide to prognosis in the chronic type. Many patients with mild chronic nephritis recover; an anatomically imperfect kidney can function efficiently. A diseased kidney, like a diseased heart, must be under observation for a long period of time before definite conclusions can be drawn. Many of these patients will

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(7) Jour. Amer. Med. Ass'n., Feb. 19, 1921.

stand severe infections without acute exacerbations of nephritis, but they are more prone to follow upper respiratory infections. For this reason all foci of infection should be treated, such as diseased tonsils, carious teeth and otitis media (acute or chronic). They act as a reservoir of toxic material which the kidneys drain.

Unusual Case of Alkalosis and Impairment of the Excretory Power of the Kidneys. J. L. Morse[8] reports the case of a girl of 10 who had never been very strong. She had wet the bed since she was two years old, having stopped previously. Her urine had been examined in 1916 and traces of albumin and pus were found. She had had pain in her feet for three months and in her knees for a week. She was poorly developed and nourished. Her complexion was pale and sallow. Her teeth were poorly cared for and there were several cavities and old roots. The urine was pale, very cloudy, slightly acid in reaction and of a specific gravity of 1005. It showed a slight trace of albumin. The sediment contained a great many pus cells.

She was started at once on 30 grains of bicarbonate of soda every four hours. On the morning of May 5 the dose was increased to 60 grains every four hours. That afternoon her hands and fingers began to be stiff and in the evening were in the typical position of tetany. The next morning her legs and feet also assumed the position of tetany. There was a marked facial phenomenon on both sides. At that time she had had 270 grains of bicarbonate of soda and the urine was alkaline in reaction for the first time. She was drowsy that day, was very thirsty and passed much urine. Edema of the face appeared the morning of May 7. The signs of tetany continued. There were also attacks of slight spasm of the larynx. During the morning she began to vomit continuously. She began to have convulsions the morning of May 8 and soon became unconscious. The bicarbonate of soda was then stopped after she had had a total of 750 grains in five days. The diagnosis of spasmophilia was made and it seemed reasonable to suppose that it was due to the bicarbonate of soda which had been given for the pyelitis.

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(8) New York Med. Jour., Dec. 18, 1920.

Under active treatment with glucose and water by mouth and by rectum and with water subcutaneously, she gradually improved and by the end of a week all signs of spasmophilia were gone and she was in good condition. The urine still showed evidences of pyelitis.

On June 3 she was started on 15 grains of urotropine (hexamethlyenamine) and 20 grains of acid sodium phosphate three times a day. Acid sodium phosphate was increased June 9 to 20 grains every four hours. The next morning she complained of being tired, went to bed and was more or less drowsy all day. In the afternoon she complained of headache and began to vomit. The facial phenomenon and peroneal reflexes were present. She was very thirsty and edema of the face developed. The acid sodium phosphate and urotropine were stopped the next morning. She had had during the week 660 grains of acid sodium phosphate, which is equivalent to 110 grains of sodium by weight. The evidences of spasmophilia began to diminish as soon as the drugs were stopped and on June 14 she was well again. The excretory powers of the kidney were very much diminished and there was nitrogen retention. On August 9 small amounts of bicarbonate of soda were ordered three times a day. Five days later she had tetanic manifestations lasting a few minutes. The facial phenomenon and peroneal reflexes were present. She was given 15 grains of citrate of potash every four hours, this being increased to 30 grains every four hours on August 23. Three days later the facial phenomenon was increased and the peroneal reflexes reappeared. It is very hard to understand or explain the marked impairment of the excretory powers of the kidneys, there never having been at any time any evidence in the urine of disease of the kidneys themselves.

The development of spasmophilia is easier to explain. On account of the impairment of their functions the kidneys were unable to excrete the salts given for the treatment of the pyelitis. If spasmophilia is due, as it seems reasonable to suppose, to a disturbance of the balance between sodium and potassium on the one side and calcium and magnesium on the other, all the conditions necessary for the development of the disease were present. Practically, it makes no difference whether the balance was disturbed by a simple retention of sodium or potassium without any driving out of calcium and magnesium or by a combination of the two. The only treatment seems to be to spare the kidneys as much as possible by limiting the proteins in the diet to minimum needs and to favor the elimination of excretory products through the kidneys by the administration of large amounts of water.

Enuresis. W. E. Carter[9] recommends the removal of all local morbid conditions, the neutralization of highly acid urine and the relief of constipation, but emphasizes that the major treatment of enuresis should be directed toward the training of the nervous system. The coöperation of the mother is of great importance. The author's treatment employed at the University of California Medical School consists of restricting fluids after 4 o'clock, in ascertaining how often during the night the child wets the bed and anticipating this time by awakening the child and inducing him to urinate voluntarily. After the child is six or seven years old, his coöperation can be obtained by having him write each morning: "I wet the bed last night" or "I did not wet the bed last night." A prize should be offered for a whole week of success. In order to educate voluntary control of the urinary center it is well to teach the child to inhibit or accelerate the urinary stream at such commands as "stop"—"start," at least twice daily.

[Success in the treatment of enuresis depends to a considerable degree on the intelligent coöperation of parents in the training of the children.—Ed.]

Isolation of B. Dysenteriae (Flexner). From the Urine of an Infant with Dysentery. True dysentery bacilli have rarely been found in the urine of patients suffering from dysentery. Catherine Creighton, C. E. Wagner and W. C. Davison[10] report the case of a girl of 27 months illustrating that typical *B. dysenteriae* (Flexner) may be found in the catheterized urine of a child with bacillary dysentery without vaginitis, pyelitis

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(9) Archiv. Pediat., May, 1921.
(10) Bull. Johns Hopkins Hosp., February, 1921.

or other urinary complications. The organism was discovered as the result of routine cultures.

THE SKIN

The Relation of Food to Infantile Eczema. O'Keefe[1] states that sensitization in the exclusively breast-fed infant is an interesting feature. Some infants were found sensitized to proteins which they had no history of ever having ingested. One such nursling was sensitized to cow's milk casein. The eczema improved when the milk in the maternal diet was cut down to a pint a day. It was found then that to make up for this diminution in milk in her diet, the woman had been taking cheese and cream. These were omitted from the maternal diet and the child's skin cleared completely in two weeks. This child, five months later, showed a relapse of the eczema when the mother commenced to wean him and use cow's milk in his diet. At this time he showed a negative reaction to casein. Without knowledge of his history it would have been difficult to have determined the cause of his relapse.

Another child whose mother gave a history of eating large amounts of oatmeal showed sensitization to oat and egg proteins. The mother was intelligent and was positive the child had never been given either egg or oat in any form. The mother showed no evidence of sensitization to egg or oat and gave a negative test to both these substances. Elimination of these two articles did not result in improvement during the month that this case was under observation. The mother then failed to return. It was learned that the eczema had persisted.

Another nursling of six weeks gave a positive reaction to codfish. The mother's diet was said to contain a large amount of fish. This child's skin cleared up when the cod was omitted from the maternal diet.

Three other exclusively breast-fed infants showed positive reactions; two to egg and one to lactalbumin. One of the two showing a reaction to egg did not clear up until weaned at the age of one year. The other showed

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(1) Boston Med. and Surg. Jour., Nov. 11, 1920.

steady improvement when the egg was omitted from the mother's diet, and at the end of six weeks was free from eczema. In the nursling sensitized to casein, reduction of the milk in the maternal diet effected some improvement in a month, and at the end of another month cleared up entirely and has remained so for over six months, during which time the mother has limited the milk in her diet.

Such findings suggest that foreign proteins may pass from the mother in her breast milk in sufficient amounts to result in sensitization of the infant. A biologic investigation of breast milk might throw light on this point.

Seven cases of this series showed an excess of fat in the stools. Reduction of the fat to within the individual tolerance resulted in each instance in great improvement in the skin condition. Five of these cases were sensitized to casein, one to egg; one showed no cutaneous response to any of the proteins used. In each case a relapse occurred when the fat was again increased beyond the child's tolerance as shown by stool examinations. The improvement following a reduction in the fat occurred without any change in the amount of protein in the diet other than that incident to the cream reduction. In these cases the fat was the predisposing factor rather than the causative factor of the eczema. An excess of fat interfered with the digestive processes or with the integrity of the intestinal walls sufficiently to permit undigested protein molecules to enter the circulation. There is no doubt that unsuitable forms or amounts of carbohydrate in the child's diet act in a like fashion to pave the way for protein inroads.

[With increasing experience we are forced to the conclusion that dietotherapy alone is not sufficient in most cases to cure infantile eczema.—Ed.]

The 41 per cent. of positive reactions occurring in this series of eczemas is in striking contrast to the percentage occurring among normal children, in whom Baker reports the incidence of protein sensitization to be an almost negligible factor.

In considering the results of treatment it is difficult to gauge the part played by external therapy. It is always a great comfort to the patient. In some cases, moreover, it seems to be alone sufficient to effect a cure. Theoretically it can not be considered more than a palliative measure if we are to believe that the disease is a result of food poisoning. O'Keefe says that he would not care to be deprived of the aid of the dermatologist either in the diagnosis or treatment of the disease.

As an aid to regulation of diet the protein skin tests give information which can be obtained in no other way. These tests do not supplant the older methods of determining what does and what does not agree with a particular infant, but they do supplement such methods. All persistent cases of eczema should have the benefit of whatever knowledge can be gained of their particular idiosyncrasies by this method. It should not be to the exclusion of a careful dietary history and a complete physical examination with especial attention to the stools. All these data are important, because they enable intelligent management of the child's diet.

The intimate relation shown to exist between food and eczema in so large a percentage of these cases justifies the conclusion that dietary regulation is essential in the treatment of this condition.

Keratitis Diffusa Fetalis (Ichthyosis Congenita). An extreme and typical example of this condition is reported by J. H. Hess and O. T. Schultz.[2] Thickening of the horny layer is marked. The hyperkeratosis is limited to those portions of the skin which normally develop a stratum corneum, and ceases sharply at those situations where the normal stratified horny epithelium goes over into non-hornified epithelium.

Associated with the abnormal keratinization are obliquity of the course of the hair follicles and of the skin glands, fissuring of the epidermis, and deformities and failures of development of the phalanges and of the face. Evidences of papillary hypertrophy are present. The condition is considered to be primarily one of skin hypertrophy, which leads to an increased formation of epidermal horny material.

In the fully developed condition, atrophy of the skin is more prominent than hypertrophy, except in so far as

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(2) Amer. Jour. Dis. Child., April, 1921.

the horny layer is concerned. The dermal papillae become shorter, flatter and less closely placed. Hairs, sebaceous glands, and sweat glands disappear, and there is a decrease in elastic tissue, the latter element remaining present in largest amount beneath the fissured areas.

The fissuring of the epidermis and the deformities of the extremities and other portions of the body are held to be secondary to the atrophic changes, being brought about by retraction of the skin.

With the exception of the thyroid and the lungs, the internal organs are negative, except for the marked congestion present.

The thyroid is undifferentiated and morphologically non-functioning. Deficient thyroid function during the developmental period may be a factor in the condition. The condition has reached such an extreme degree of development by this time of birth as has been found to be incompatible with life in other cases. In this case pneumonia was the immediate cause of death.

For the condition reported in the literature under the name ichthyosis congenita and a variety of other terms, which are based on some superficial gross anatomic peculiarity of the skin, the designation keratosis diffusa fetalis, based on the pathologic condition common to all the cases, is proposed.

The reported cases fall into three groups. In the first, to which the case here reported belongs, the abnormality is so extreme at birth as to be incompatible with a duration of life of more than a few days. In the second group, *keratosis diffusa fetalis mitior,* the condition is present at birth, but is not developed to so extreme a degree as in the first group. The duration of life depends on the rate at which the condition develops after birth and on the degree to which it develops. In the third group, *keratosis diffusa fetalis tarda,* evidences of the skin anomaly may not be present at birth. They develop after a period of variable length and the degree of development which they reach is also variable.

Keratosis diffusa fetalis is a condition, having its origin in the fetal period of development, the most striking feature of which is marked increase in the horny layer of the epidermis and abnormal hornification of the epithelial skin structures.

The hyperkeratosis, which becomes the predominating element in pathologic process, is believed to be the result of a preceding stage of hypertrophy and hyperplasia of the skin.

Absence of the thyroid or deficiency of thyroid function during intra-uterine life may be a factor in the causation of the epidermal changes which characterize keratosis fetalis.

THE TEETH

Temporary Teeth. J. Ross Snyder[3] finds little evidence to indicate that due consideration is being given to the subjects of oral hygiene and oral prophylaxis. According to the New York State Dental Inspector, it has been estimated that temporary teeth emerge through the gums practically perfect in 98 per cent. of children; 90 per cent. of children in the first grades in all sections of cities have bad teeth; one third have abscessed conditions in their mouths, and every fourth or fifth child does not have proper masticating surfaces. Many gastro-intestinal disturbances can be traced directly to this source. An unclean mouth is often responsible for diseased tonsils and other diseased glands and it has been demonstrated that children with bad teeth are more susceptible to infectious diseases. Premature loss of the deciduous teeth is the most frequent etiologic factor in mal-development of the face and jaws. Probably a majority of these children display no strikingly marked symptom but many indications are apparent of the child's being below standard either mentally or physically. In every community in which oral hygiene has been introduced as a part of the school system brilliant results were obtained. Parents must be taught that when a child is taken to the dentist only after toothache has developed, injury which is often irreparable has already been suffered by the tooth.

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(3) Jour. Amer. Med. Ass'n., Aug. 14, 1920.

Sequestrating Inflammation of the Tooth-Pulp in Earliest Infancy. After careful clinical and pathologic description of six cases afflicted with this disease, M. Zarfl[4] comes to the following conclusions:

This disease is caused by a necrotizing purulent inflammation of the alveolar contents (usually the upper jaw) which ends with the expulsion of the tooth-pulp.

The affection may be of phlegmonous (in half of the cases after erysipelas, also after stomatitis) or it may be of osteomyelitic origin.

The course of the phlegmonous form is very rapid, first foci of inflammatory swelling, and discoloration of the mucous membrane, then necrosis and expulsion of the tooth-pulp.

Recovery may ensue, but as a rule exitus follows because of the primary disease or because of septic general infection.

The course of the osteomyelitic form is still more unfavorable.

There are purulent foci in the bone marrow of the jaw, they extend to the alveoli with inflammatory signs of the soft parts, gradual expulsion of the tooth-pulp into the antrum oris, extension of the process to the surrounding soft parts, lachrymal canal and nasal cavity, and exitus may follow.

The disease is characterized by absence of pain and little disturbance of the nursing ability.

Of twelve cases observed ten ended with death. Autopsy on the body of a patient who recovered and later died of some other disease showed that the inflammation left the pulp of the permanent tooth untouched. Treatment consists of the generally used remedies for erysipelas and stomatitis. Loosened chips of tooth may be removed. In osteomyelitis of the jaw surgical procedure is indicated. Because of the danger of mastitis the breast milk is to be pumped.

NOSE, THROAT AND EAR DISEASES IN CHILDREN

Acute Otitis Media in Influenza from the Pediatric Standpoint. P. Nicholson[5] states that influenza is the

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(4) Zeitschrift f. Kinderheilk., June, 1920.
(5) Archiv. Pediat., December, 1920.

commonest cause of acute otitis media, and in most cases of the acute suppurative type. The infection may involve children from birth to adult life but is especially frequent in infants. In acute otitis media, the bacteria may be the streptococcus, staphylococcus, pneumococcus, Klebs-Loeffler, or influenza bacilli. On examination of a purulent ear discharge, a mixed infection is often found in which other organisms than the inciting ones may predominate, so that frequently an influenzal ear infection may show few or no influenzal bacilli in the discharge, other organisms predominating and overgrowing them. In some severe cases, however, we may obtain a pure culture of influenza bacilli.

Infection in the nasopharynx enters and travels along the Eustachian tube in the ear. Otitis media, due to an influenzal infection, is very prone to become purulent. In influenzal otitis media, owing to the large numbers and virulence of the bacteria, the cellular tissue of the tympanum is involved and in most cases the mastoid antrum as well. All cases with a profuse purulent discharge involve the mastoid. The pus, if not evacuated by operation, in most cases ruptures through, and causes sloughing of the drum membrane. This takes place in from one to four days in severe cases; in mild, purulent cases, in from ten to fourteen days, discharging profusely in from one to two weeks, then subsides. In from three to four weeks it ceases in the average case. The most constant symptom of acute otitis media is elevation of temperature ranging from 100° F. to 106° F., though the usual range is from 100° F. to 103° F.

Next to temperature, pain is the most reliable symptom of acute otitis media. There are many cases, especially in infants, in which pain does not seem to be a factor. As a rule the degree of pain depends on the acuteness of the inflammation, but even more especially varies with the amount of pressure exerted by the secretion pressing on the ear drum. Often in infants the first evidence of acute otitis media is a purulent discharge without any evidence of pain.

Almost all cases of acute purulent otitis media with early diagnosis and prompt treatment, recover without any complication or subsequent involvement of hearing. Repeated attacks of acute otitis media, no matter how well treated, eventually cause middle-ear catarrh, with impairment of hearing, hence the importance of removing tonsils, etc., as a form of preventive treatment. In very few severe cases, mastoiditis, involvement of the internal ear, facial paralysis, sinus thrombosis, meningitis and brain abscess may develop. As a diagnostic aid the white cell count is of no value except to aid in determining the onset of mastoiditis and sinus thrombosis. The treatment depends on how early the case is seen. If very early and the ear drum is slightly red and not bulging, it is often well to apply, on an applicator through the nose, a 1-2000 adrenalin solution in a 2 per cent. solution of cocaine, directly to the Eustachian orifice, followed by an application of 25 per cent. argyrol solution. This treatment can be repeated daily and, in addition, an oil may be dropped into the nose every third hour. With the local treatment should be combined light diet and absolute rest in bed.

Paracentesis requires surgical cleanliness and in most cases is a decidedly painful operation. Wax and loose epithelium should be removed, an applicator placed in the ear with a small pledget of cotton, wet with a solution of equal parts of menthol, cocaine and phenol crystals, and left in contact with the ear drum for five minutes. This will both anesthetize thoroughly the drum and sterilize the external auditory canal. After removal of the cotton pledget, with a straight bistoury-bladed paracentesis knife, a clean curved incision should be made in the ear drum, beginning in the lower posterior quadrant near the canal wall and extending well up for one-quarter of the circle into the upper posterior quadrant. Irrigation is liable to cause a secondary mixed infection and greatly increase the danger of severe complications.

The after-treatment consists of daily inspection of the ear, mopping out any pus and, if very thick, an occasional application of pneumatic suction, then the application of 5 per cent. phenol in glycerine to the ear drum and external canal. Frequent paracentesis may be necessary during the course of the case. Whenever there is long-continued very profuse discharge, long-continued elevation of temperature, after a free incision of the ear drum, or mastoid tenderness, or edema, an icebag should be placed just back of the ear. During the last year the author saw eight operative mastoid cases in infants from 9 to 15 months of age. All these infants had perfect recoveries by early operation, with no impairment of hearing.

Removal of Adenoids in Infancy. Todd[6] states when removing adenoids under the age of 6 months, especially if the baby be undersized or ill-developed, a general anesthetic is neither required nor advisable. The infant is held in a sitting position by a nurse, a small curette is passed up behind the soft palate into the postnasal space and brought down with one sweep.

Owing to the small size of the postnasal space, it requires but a tiny pad of adenoids to give rise to symptoms, but in some cases one is surprised at the amount of adenoids removed. As a rule, very little bleeding takes place, and there is rarely any shock, but the infant should be kept warm, and if there appears to be any shock, should be given a drop or two of brandy in a little milk.

It is advisable not to feed the infant for three hours before the operation takes place, so that it can be given the breast or bottle within ten minutes or so after the operation has taken place.

Todd has frequently performed this operation on infants, the youngest of which was but 3 weeks old, and he has never observed any harmful results in consequence. On the contrary, almost immediate benefit will be noted, as the child soon begins to breathe normally through the nose and to suck with comfort; otorrhea and bronchial symptoms, if present, rapidly disappear, and the weakly infant thrives and becomes strong.

For these reasons he strongly urges that adenoids should be removed, no matter how young the infant may be, whenever they give rise to any symptoms which may adversely affect its immediate or future welfare.

Results of the Presence of Adenoids in Infancy. Relief by operation of adenoid obstruction in infants under two years of age is advocated by R. G. Freeman,[7] be-

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(6) Practitioner, November, 1920.
(7) New York State Jour. Med., February, 1921.

cause they do not have the intelligence that leads older children to seek relief by a wide open mouth, and consequently suffer more from fright and insufficient intake of air. Their nervous stability is less the younger they are, therefore, he says, babies are more likely to develop reflex nervous symptoms than older children. The statement that adenoids removed in infancy are more likely to recur than if removed later is without foundation. Adenoids are very common in early infancy. In his last 247 cases 132 patients had had adenoid symptoms from birth or early infancy, and in 111 of these the symptoms were persistent and operation was resorted to. An obstructive adenoid should be removed by operation as soon as it has persisted several months. Those children in whom it has existed from birth should be operated on by the third or fifth month. Neglect to operate at this time leads to the development during the first year of the short upper lip, the narrow high vault, and the collapsed nostrils which are associated with the adenoid face. Neglect to operate at this time leads also, in certain cases, to reflex conditions, failure to gain in weight, restlessness, convulsions, asthma and eczema.

End-Results of Tonsillectomy. J. A. Vietor[8] concludes that tonsillectomy and adenoidectomy in well-chosen cases, performed by general surgeons, in a general service, under proper conditions, show 97 per cent. symptomatically good results. The complications arising either early or late are few and not severe in character. The benefits arising both in simple cases and those in which tonsils act as a portal of entry, warrant their removal. The dangers of the operation are almost *nil*, as shown by the fact that there were no deaths due directly or indirectly to the operation in this series of 500 consecutive cases.

Sinuitis in Children. Phelps[9] states that a diseased sinus may produce local symptoms, or it may act as a focus but produce general symptoms. Every child with meningeal symptoms, an anemia, increase of temperature of unknown origin, or with asthma or nephritis, pyelitis, anthritis, endocarditis, headaches, or long-stand-

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(8) Archiv. Pediat., December, 1920.
(9) Journal-Lancet, November, 1920.

ing colds, bronchitis, indefinite gastro-intestinal symptoms or cyclic vomiting, should be very carefully examined for sinuitis. The most frequent local symptoms are nasal discharge and headache. If it can be established that the headache decreases when the discharge begins, or the headache is worse in the morning or on bending the head forward, it is suggestive of sinuitis. None of his patients complained of severe headache except those with a meningeal lesion. Usually the ache is not frequent or common. Any child with a known sinuitis in which the headache does not improve on treatment should be watched carefully for signs of meningeal involvement. Sneezing is said to be a common symptom. Tenderness over the sinus, swelling of the eyelids or cheeks, and fistula in the upper or lower lid are suspicious signs of sinuitis. Two of the author's patients had a swelling of the forehead between the eyes, which was soft and not tender, yet was a subperiosteal abscess from a perforating sinus infection.

The rôle of the sinuses as a focus of infection is not so well-established in pediatrics as it is in general medicine. More attention should be paid to this relationship, which will require a greater coöperation between the pediatrician and the rhinologist. In this connection Dean has shown that cultures from the sinus which acts as a focus usually show hemolytic streptococci.

Frequent colds was the complaint in nineteen cases, most of which were maxillary infections.

Bronchitis occurred in eight cases, and was relieved in all by treatment of the sinuses.

Otitis media was present in five cases; three patients were cured, and their history extends over several years. The other two required mastoidectomies.

Nephritis in an acute form was present in one case, which cleared up after a sinus operation.

Bronchial asthma was present in two cases, both maxillary infections, and in both immediate relief followed the treatment of the sinuitis, but the relief was not permanent. The author found no recurrence of the sinus infection, however.

Eye complications: Three orbital abscesses, two cases of orbital cellulitis with no pus found on operation or postmortem; five swellings of the eyelids and one abscess of the lower lid are in this group. Most of these complications were the first symptoms of the sinus disease.

Intracranial complications occur in children oftener than is usually considered, for the average case of meningitis is never examined for a sinus infection.

Palliative treatment is successful in the majority of cases when it is directed toward establishing drainage and ventilation. The use of oily and alkaline sprays, inhalations and nasal irrigations, together with suction and a weak adrenalin solution, will often relieve the condition better than an operation. Vaccines are used by some with success.

Should these measures fail the drainage should be increased by removing the obstructions, being careful to destroy as little nasal tissue as possible. The tonsils and adenoids may be removed, and the anterior tip of the middle turbinate trimmed, but never removing the entire turbinate. These measures, like those above, are directed toward producing drainage through the natural orifices and should be tried whenever there is a reasonable chance of success.

In certain fulminating types and in cases not relieved by other methods a radical operation is indicated. This operation is the same as is done in adults, except that no external operation should be done on the antrum on account of interfering with the development of the teeth.

Chronic sinusitis occurs in children quite frequently and may act as a focus of infection.

The *x*-ray is the best method of diagnosing a sinus infection.

Most patients recover without any radical operation being performed.

[The nasal sinuses of children are poorly developed. The frontal sinus develops in the second year of life. At six years it is about the size of a pea. This sinus becomes established at the fifteenth year. The antrum of Highmore is present in the new-born, though it is very small. At the second year of life, it has increased considerably in size. The ethmoid sinus remains small during infancy, though gradually increasing in size.—Ed.]

Retropharyngeal Abscess. An Experience with Sixty Cases. In this condition the diagnosis is rendered more difficult, J. Friedman and S. D. Greenfield[1] say, in children in whom the affection does not develop with an acute onset. In these patients the abscess may form without pain or fever, the pus collecting so slowly that two or three weeks may elapse before alarming symptoms become manifest. In addition, the abscess may be atypically located, in that it is so far down in the pharynx that with the ordinary examination it is hidden from view. The acute type, which is the one usually encountered, is caused by those organisms found lurking in the oropharynx and the nasopharynx, *viz.*, streptococcus, staphylococcus, and pneumococcus. The chronic or secondary type is generally accepted as being due to the tubercle bacillus, and originates primarily in the bodies of the cervical vertebrae. Of the cases seen, all have been of the acute or primary form. The first case was in a child aged 21 days.

Retropharyngeal abscess in most instances occurs within the first three years of life. In the large majority of the authors' cases there were diseased tonsils and adenoids. The only positive way of confirming or ruling out a diagnosis of retropharyngeal abscess is by palpation with the finger.

The general practitioner often mistakes retropharyngeal abscess for acute tonsillitis or laryngeal diphtheria. Early and adequate incision will insure rapid and complete recovery in most cases. Anesthesia is absolutely contraindicated. The fear that is commonly expressed concerning complications arising from aspiration of the pus has been over-emphasized.

New Apparatus and Method for Puncturing the Superior Longitudinal Sinus in Infants. A. B. Ratner[2] has devised an apparatus which he finds simple, satisfactory and inexpensive and which he has used on a large number of infants in the New York Nursery and

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(1) New York Med. Jour., April 20, 1921.
(2) Amer. Jour. Dis. Child., February, 1921.

Childs' Hospital. It consists of a small metal block, with an acutely bevelled base. An opening of 18-gauge bore runs through the middle of the block which permits the insertion of the needle. The needle is 1⅜ inches long, has a Luer-slip and a short bevelled point. The length of the needle is decided on and tightened by means of a screw. The average distance to enter the sinus ranges from 3 to 6 mm. The point of entrance is chosen near the posterior angle of the fontanelle along an imaginary line drawn between the middle of the bridge of the nose and the posterior angle of the fontanelle. In order to inject the bevelled edge of the block is brought in close apposition to the scalp.

SYPHILIS

Feeblemindedness in Hereditary Neurosyphilis. O. J. Raeder[3] conducted blood and spinal fluid examinations on twenty-two children, born of syphilitic parents. He found that various degrees of syphilitic infection are present in a definite order in a family of several children, the oldest, born soonest after the parental infection, showing the greatest injury and the succeeding children showing milder degrees in order.

Psychometric examinations done on these children show corresponding psychic terracing going *pari passu* with the grades of physical defect.

The youngest children of a family though sero-negative, have been found to be feebleminded to a slight degree. The syphilitic injury to the nervous system either projects beyond the physical defect, or by reason of the peculiar reactions of the brain compared with other organs we have a finer indicator in it than in ordinary tissues. Or, again, while the central nervous system may recover more rapidly in succeeding births as registered by the Wassermann, colloidal gold and other tests, the recovery may not be so complete.

The author concludes that mental deficiency in congenitally syphilitic children of not feebleminded parents is in the majority of cases due to syphilis. The virulence

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(3) Amer. Jour. Dis. Child., March, 1921.

of the congenital syphilis toxin in a given fraternity as evidenced by psychometric analysis and biochemical test varies inversely with the order of birth.

Congenital Syphilis Among the New-Born. The object of this investigation by S. M. Ross and A. F. Wright[4] was to determine the incidence of congenital syphilis among the new-born infants in a mining town and an industrial town in one of the Midland counties. The result of the investigation of the 300 cases collected in the mining area showed that in ten cases of 3.5 per cent. the serum test was positive. A similar investigation was also carried out amongst the patients of a large charity practicing midwifery in an industrial town in the Midlands. Only forty specimens were sent. In this series one case was positive. The number of specimens dealt with is too small to draw any definite conclusions from, but the percentage of positive reactions obtained and calls for further investigation in wider areas: first, among unselected cases and second, from those where either parent is known to be infected, so that the reliability of the test may be definitely gauged from the results.

A Report on the First Year's Work of a Clinic for Syphilitic Children. R. C. Jewesbury[5] reports that during the first twelve months a total of 145 children were seen whose mothers were known to be syphilitic. Of these, nine mothers became infected after the births of their children, hence the disease in these children was acquired. Of the remaining 136 mothers, infected before the birth of the child forty-seven had treatment before or during pregnancy. In eighty-nine cases the mothers had received no treatment previous to the birth of the child.

A few children of syphilitic mothers who had received no treatment were quite free from any signs, and have given negative Wassermann reactions even up to the age of 10 to 14 years. Many children showed the usual signs seen in typical congenital syphilis; rash and snuffles appeared in from two to eight weeks after birth. In a certain number of children seen, in whom there was

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(4) Lancet, Feb. 12, 1921.
(5) Ibid., May 7, 1921.

no history of previous symptoms, symptoms developed late, after the fifth or sixth year—*i. e., "lues tarda."* This group amounted to 10 per cent. of all cases examined. In these children lesions of the following structures were present: bones—periostitis; joints—synovitis; eyes—interstitial keratitis; brain—particularly affecting mental condition; ears—deafness; and teeth.

The Wassermann reaction has been found to be a very valuable and reliable test. In the case of syphilitic infants, the reaction is often negative during the first few months of life and later becomes positive.

As to the effect on the child in untreated syphilitic mothers, seventy-seven families were investigated; total number of pregnancies, 322. Of these ninety-seven (30.2 per cent.) resulted in miscarriage or stillbirth, seventy-three (22.8 per cent.) resulted in death in infancy or early childhood, and 152 (47.0 per cent.) were still alive at time of investigation. Mortality of children born alive was 32.4 per cent.

It was found that when the treatment of the mother was not begun until the seventh month or later of pregnancy that the child usually showed well-marked evidence of syphilis, but in the majority of mothers who had received treatment not later than the fifth month of pregnancy the children were born apparently healthy and gave negative Wassermann reactions.

In thirty cases receiving full course of novarsenobillon and mercury, and kept under observation, the Wassermann reaction has been changed from positive to negative. In some a strongly positive reaction has been reduced. In some the reaction has not been affected after a course of six injections of novarsenobillon and mercury. The cases benefiting least by treatment with regard to the Wassermann reaction and physical signs are those of the late manifestations affecting children of from 5 to 10 years, and especially those in whom the central nervous system is involved.

Early signs quickly cleared up, especially rashes and condylomata. Rhinitis was less easily cured. Usually rapid improvement in the general condition occurred, with steady gain in weight. The liver and spleen were reduced in size.

Contribution to the Treatment of Syphilis in Infants. From their experience with the treatment of syphilitic infants at the Kinderklinik of the municipal hospitals and the Säuglingsheim in Dortmund, St. Engel and Martha Türk[6] come to the conclusion that there are two stages for the treatment of this disease. In the beginning, when intravenous administration is extremely difficult because of the size of the veins, mercury is used. The preparation of their choice is novasurol [a German proprietary remedy] given intra-muscularly. It acts quickly on the specific manifestations. The actions can be further enhanced by the use of mercury protiodide. This does not produce a complete cure, it simply abates the disease sufficiently to allow the development of the infant.

Later, toward the end of the first six months, the veins of the head, especially the temporal veins become sufficiently large to allow the intravenous injection of salvarsan, preferably neosalvarsan. It is well tolerated by the infant and may be given in dosage of 0.15, once a week, independently of the weight of the child. Larger doses may be desirable, but have not been sufficiently worked out. Possibly the action may be enhanced by simultaneous use of mercury though it does not seem to be absolutely necessary. After the use of neosalvarsan for from six to eight weeks, the Wassermann reaction usually remains negative for months.

[Why not inject neosalvarsan dissolved in oil intramuscularly where intravenous medication is difficult or impossible?—Ed.]

RICKETS

Diet as a Factor in the Cause of Rickets. L. Findlay[7] concludes from a survey of experimental and clinical material that it is hardly justifiable, at least at the present moment, to place rickets definitely among the deficiency diseases, or to incriminate the fat-soluble A vitamine as the etiologic factor. If rickets is a deficiency disease, then it behaves very differently to the other

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(6) Therap. Halbmonats., April 15, 1921.
(7) Archiv. Pediat., March, 1921.

known diseases of this nature. No one doubts that scurvy is a disease of this type, but whether or not it is possible to detect any dietetic error, a cure can always speedily be obtained by giving a food-stuff known to contain the water-soluble A substance, unless in the most advanced stages with secondary septic infection. This is in contrast with the behavior of rickets. From the histories of many examples of rickets cod-liver oil has been found to form a regular constituent of the diet and in both Hess's and in the author's prophylactic tests, rickets continued to develop in spite of the administration of fat-soluble A, rich cod-liver oil; and finally, as Dr. Mackay has shown, food stuffs rich in the fat-soluble A factor do not necessarily bring about a cure.

The supporters of the vitamine theory, as previously mentioned, criticise adversely any antagonistic piece of work. Their line of argument is invariably the same. If rickets has not developed, then the food-stuffs of the diet must have contained the anti-rachitic vitamine, and, if rickets does develop, the anti-rachitic vitamine has been absent, whatever the nature of the diet. In fact, it would seem that according to these observers the cause of rickets is settled, and that all the experimental work is intended rather as a means of discovering in what food stuffs the fat-soluble A vitamine is or is not present.

Significance of Accessory Food Substances from Vegetables for the Diet Therapy of Rickets. The influence of the addition of fresh and heated beet juice and cooked beet vegetable on the metabolism of children with and without rickets, with special reference to the phosphorus and calcium balance, has been investigated by E. Freise and P. Rupprecht.[8] The results showed a fall of the phosphorus balance during the period of administration of the juice in the children with rickets, and a similarly marked or even more marked increase of phosphorus retention in the periods following. An increase of the previously low calcium balance occurred regularly during the administration of the juice which became even more marked in the periods following the administration. The heated juice and the cooked vegetables did not have this effect. The fat and nitrogen metabolism were not essen-

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(8) Med. Klinik, 1921, vol. 17, No. 1.

tially influenced. In the non-rachitic child the variations of the phosphorus and calcium retention during and following the periods of vegetable administration appeared to have no correlation. A slight increase of calcium balance following the addition of fresh beet juice in the healthy child did not have the marked effect found in the rachitic child; heated juice even resulted in a decrease of the calcium balance. Phosphorus and calcium retention were parallel in the healthy child. Therefore, a specific influence of vegetables on the rachitic metabolism was noted. It consists in an increase of the low calcium retention characteristic for rickets, which corresponds to the improvement of the calicum balance after the administration of cod-liver oil. The superiority of the fresh vegetables over the heated and cooked vegetables, makes the assumption probable that thermolabile substances cause the changes in the phosphorus and calcium balance. At present it is not known whether the vegetables contain water soluble or fat soluble accessory food substances, or whether several active substances are contained in them, one of which is identical with the fat-soluble factor which is considered to be the anti-rachitic principle by British authors.

Dangers to Life of Severe Involvement of the Thorax in Rickets. E. A. Park and J. Howland[9] call attention to a little recognized but very definite symptom-complex which is accompanied by characteristic autopsy findings. The symptoms and pathologic changes in question are the direct result of the diseased condition of the thorax.

The material, which forms the basis for the authors' study, consists of thirty-two children between the ages of 8 months and 4½ years. All the children exhibited well-marked rachitic deformities of the thorax. In six, rachitis had not progressed far enough to produce great weakening of the thoracic wall and in four there had occurred healing or at least thickening of the ribs to an extent sufficient to make the deformed thorax rigid. The remaining twenty-two cases form the actual basis for this report. The average age was 16 months. Thirteen were boys, nine girls. All were colored. All twenty-two children were greatly under weight and undersized. They

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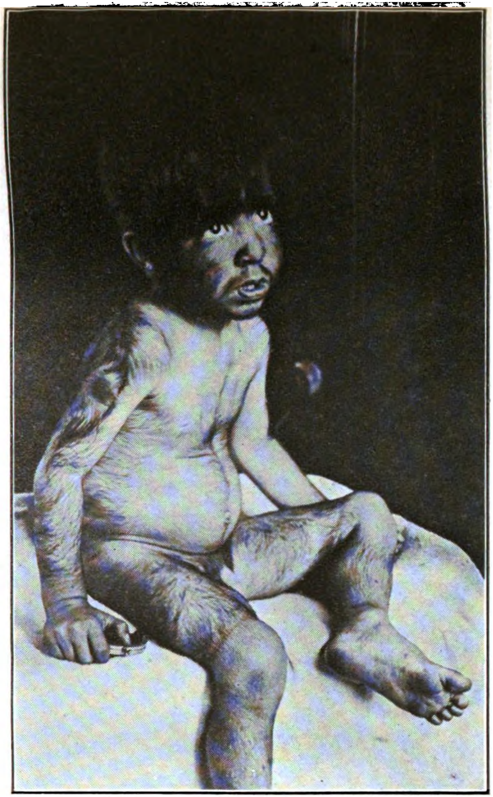
(9) Bull. Johns Hopkins Hosp., April, 1921.

showed clinical evidence of rickets in parts of the skeleton other than the thorax. A rhinitis with mucus discharge and resulting stenosis of the nasal passages was present in the majority of the children. The deformed thorax may be likened to a blunt wedge, the sternum and adjacent portions of the costal cartilages corresponding to the narrow end of the wedge. The peculiarity in its shape is due to the fact that the anterolateral portions have sunk inwards with the production of broad hollows, the deepest parts of which correspond to the sites of the costochondral junctions. Clavicles were exceedingly prominent, much bowed and stood out unusually far from the base of the neck and often were the seat of fracture. The thorax was often markedly asymmetrical. When fractures of the ribs are present, the distortion of the thorax may be greatly increased and the resulting deformities much more difficult to analyze.

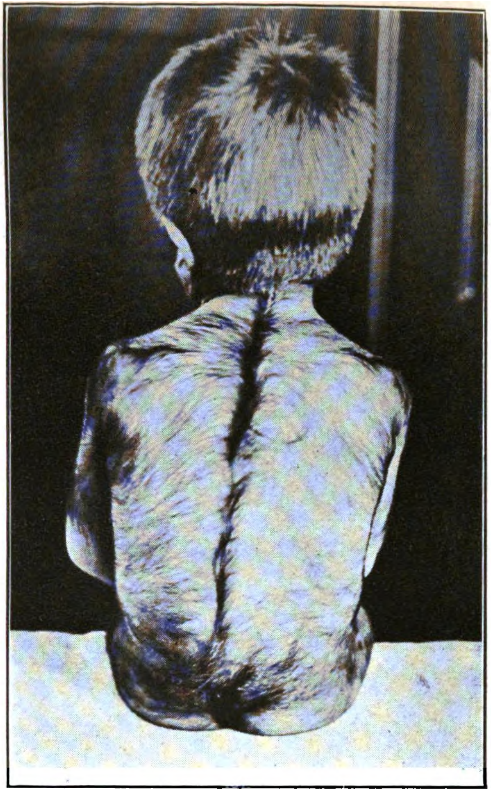
When inspiration takes place in the deformed thorax almost every deformity becomes intensified. The depressions at the sides lengthen, broaden and deepen. The floor is carried backward and inward toward the vertebral column, in severe cases from 1 to 1.5 cm. and even 2 cm. As the lateral depression enlarges, the posterior angles of the ribs involved narrow, and the whole posterior costal arch undergoes a displacement backwards.

The sequence in the development of the condition seems to be as follows: The rachitic thorax loses its rigidity, yielding during inspiration simultaneously at costochondral junctions and shafts. As the rigidity of the thorax becomes diminished, the depressions at the sides, which at first were present only during inspiration, persist during expiration. As the bones progressively lose their elasticity, the dynamic deformity gradually becomes static as well. Thoracic respiration is at first slightly, later profoundly, affected. Coincident with the impairment of thoracic respiration diaphragmatic respiration is enfeebled. The efficiency of each inspiration, therefore, is diminished. A compensation is attempted in an increased frequency of respiration and in an increased force. But the greater the force applied, the greater the collapse produced. Nature's efforts in large part defeat themselves. The diaphragm pulls its attachments

PLATE I.



A. "Dog-faced" Boy, aged three years and eleven months. Anterior view.



B. "Dog-faced" Boy, aged three years and eleven months. Posterior view.—Knowles, page 187.

yet further inward, and the accessory muscles draw the bones to which they are fastened out of position without moving or giving stability to the thorax as a whole. Owing to the progressive reduction in the size of the thorax and its loss of power to expand, the lung begins to become atelectatic. One of the parts early affected is that pressed upon by the costochondral junctions. As the pathologic process progresses, the atelectasis increases; the pressure in the pulmonary circulation rises; and hypertrophy of the right heart follows. If the rigidity of the ribs becomes still further impaired, a point is reached at which the disabled respiratory machine is just sufficient to perform its work. If now a slight additional burden is put upon it in the form of an infection, it becomes insufficient. Nature resorts to the only expedient possible; frequency of respiration becomes enormously increased. The course in such cases is subject to great variation. In one group of children the respiratory symptoms and distress became progressively worse until death intervened. In another group the condition remained essentially unchanged over a long period. From time to time the temperature would rise to 102° or 103° F. without apparent cause or any increase in the number of white blood cells. This state of affairs, characterized by alternating exacerbation and decline of symptoms, continues for weeks. If a child does not die, he may gradually improve, even though the rickets continues and lime salts are not deposited in the bones.

With the aid of cod-liver oil calcium salts can be deposited in the rachitic metaphyses and shafts and a true healing of the disease accomplished. Out of a series of twenty-two well-marked cases studied in the hospital, eleven children have died. It is probable that others of the twenty-two children discharged have died outside the institution as the result of the rachitic involvement of the thorax. The mortality in the severely affected cases is undoubtedly exceedingly high. Treatment must be prophylactic.

Calcium and Phosphoric Acid Metabolism After Administration of Large Quantities of Calcium and Sodium Phosphate. K. Blühdorn[10] reports the results of his investigations on two infants of 11 and 9 months of age.

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(10) Zeitschr. f. Kinderheilk., 1921, vol. 29, Nos. 1-2.

The first showed signs of rickets and latent spasmophilia, the second severe nutritional disturbance. The first child who received from January 1 to February 14, 78 grams calcium chloride siccum gained 490 grams. From February 23 to March 10 he received 60 grams calcium lactate and gained 450 grams. He received 14 grams of sodium phosphate during the first period.

The second child received from March 16 to April 30 about 36 grams calcium chloride, 60 grams calcium lactate and 10 grams sodium phosphate and gained 1310 grams. Clinically these children showed no ill effects from the large quantities of calcium. Diuresis was not increased, and there was no diarrhea.

In both cases a part of the calcium administered was probably permanently retained. It is not surprising that the calcium balance becomes negative after discontinuing the large doses of calcium, since the absolute retention during these periods is very high. The largest part of the calcium is excreted in the feces even during the administration of large quantities. The phosphoric acid metabolism runs parallel to the calcium metabolism. The author did not observe a phosphoric acid depletion from the administration of large doses of calcium. On the other hand, the administration of sodium phosphate not only had no unfavorable influence on the calcium balance, but actually improved it. Investigations of the chlorine metabolism indicate the possibility that a considerable part of the calcium chloride administered is retained as such, and that this combination is dissolved again after the administration of calcium is discontinued.

Treatment of Rickets with Cod-Liver Oil. According to W. Stoeltzner[1] the specific antirachitic action of cod-liver oil is due to its content of certain oxy-acids. Phosphorus which *per se* does not affect rickets increases the effect of cod-liver oil by accelerating catalytically the oxidation of unsaturated acids in the cod-liver oil to the actively antirachitic oxy-acids. By technical oxidation of cod-liver oil preparations may be obtained which are actively antirachitic and superior to the phosphorized cod-liver oil, in the form of easily ingestible powders. At present the introduction of this powder in thera-

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(1) Münch. med. Wochenschr., March 4, 1921.

peutic practice is not advised. The author's investigations confirm the findings of Freudenberg and Klocman who arrived at their conclusions from entirely different view points.

The Cure of Infantile Rickets by Sunlight. A. F. Hess and L. J. Unger[2] report that infants have been exposed to the direct action of the sun's rays for from half an hour to several hours, the period of treatment being varied according to the intensity of the sun and the sensitiveness of the skin. Five infants, three between 6 and 12 months, and two between 12 and 18 months of age, were treated in this manner.. In one of the cases which responded most favorably, the patient could be given the sunlight treatment only on seven days between April 3 to 19; during this period exposure was given for a total of twenty-five hours. In every instance there has been marked improvement in the rickets as evidenced by the calcification of the epiphyses noted by means of the Roentgen ray. The alteration resembled that which follows the administration of cod-liver oil, and, in one instance, occurred thirteen days after heliotherapy was begun. The general condition of the infants was also benefited, as were other signs of rickets, such as beading of the ribs and flabby musculature. In one case, calcification of the epiphyses of both wrists was evident, when as yet but one arm had been exposed to the sun—evidence that the action of the rays is systemic and not local. The babies who were cured by means of the sun's rays were on regular dietaries, such as whole milk and cereal, or dried milk, cereal and orange juice. This diet was not altered during the course of treatment.

It would seem that the action of the sun's rays will have to be taken into account in metabolism studies on animals and man which concern themselves with the body exchanges of the inorganic salts.

Studies on Experimental Rickets. P. G. Shipley, E. A. Park, E. V. McCollum and Nina Simmonds[3] conclude that the two diets which were low in their content of fat-soluble A and phosphorus (diets of lots 2667 and 2806) produced in the majority of the young rats placed

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(2) Jour. Amer. Med. Ass'n., July 2, 1921.
(3) Bull. Johns Hopkins Hosp., May, 1921.

upon them pathologic conditions of the skeleton having a fundamental resemblance to rickets. The pathologic conditions produced are not identical, however, with that disease as it usually manifests itself in the human being.

The chief difference consisted in the presence of scattered or irregular deposits of calcium salts in the cartilage and epiphyses. The pictures bore a marked resemblance to those seen in rachitic children in whose bones incomplete healing has taken place.

When the deficiency in phosphorus is compensated for by the addition of a complete salt mixture containing the phosphate ion (diet of Lots 3120 and 2815), the deficiency in fat-soluble A still existing, no pathologic changes of a rachitic nature developed. The addition of the phosphate ion to the diets deficient in it and in the organic factor prevented, therefore, the development of any changes of a rachitic-like nature.

The experiments reported are not sufficiently numerous or comprehensive to permit of generalizations concerning the effects of a deficiencies of the fat-soluble A and phosphorus or of the fat-soluble A alone. The implication of the experiments is, however, plain.

(*a*) The phosphate ion in the diet may be a determining influence for or against the development of rickets.

(*b*) If the phosphate content of the diet is sufficiently high a deficiency of fat-soluble A can not cause rachitic-like changes in the skeleton.

(*c*) A deficiency in fat-soluble A can not be the sole cause of rickets. Conversely, it is necessary that the diet be low in its content of phosphorus, all other factors, except fat-soluble A, being optimal for rachitic-like conditions to develop.

Since the addition of the phosphate ion to the diet prevented the development of the rachitic-like changes in the skeleton, but had no effect in preventing xerophthalmia, it seems permissible to infer that xerophthalmia and rickets do not have an identical etiology.

The above results do not in the authors' opinion exclude the fat-soluble A from consideration as an etiologic factor in the production of rickets and kindred diseases, since the level of the blood phosphate is, in all probability, determined in part by the amount of the fat-soluble A available for the needs of the organism.

SCURVY

Infantile Scurvy Following the Use of Raw Certified Milk. H. K. Faber[4] reports the case of a child of 10 months fed almost from birth on modified raw certified milk, to which small amounts of sodium citrate were added, who developed scurvy at the age of 6 months.

It is possible, but not proved, that sodium citrate may have partly destroyed the antiscorbutic vitamine.

The use of a sodium citrate in infant feeding over long periods should be provisionally regarded as dangerous.

Contribution to the Scurvy Question. The views on the etiology of Barlow's disease are not uniform. All authors recognize the significance of a faulty, one-sided diet for the establishment of infantile scurvy. Some authors are of the opinion that sterilization and pasteurization of the milk alone are sufficient to produce scurvy; while others regard the heating as an important factor in the etiology but believe that there must be another factor which at present is not known. E. Nobel[5] studied the question of the heat stability of the vitamines present in the milk. Seven patients with scurvy were put on a diet consisting exclusively of boiled milk. The duration of boiling of the milk varied from ten minutes to one hour. The milk was concentrated to two-thirds of the original volume. All children, including one very sick one, became afebrile and free from pain just as rapidly as had been previously observed after addition of vitamines. The heat action on the scurvy vitamine is not so destructive as has been assumed up to the present time. In the cure of the cases of scurvy the quantitative amount may play an important part. Even if part of the vitamines is destroyed by the heat a relatively large quantity of food, because of concentration, may act antiscorbutically.

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(4) Amer. Jour. Dis. Child., April, 1921.
(5) Wien. klin. Wochenschr., Dec. 23, 1920.

Infantile Scurvy. J. Aikman[6] reports the case of a child of 11 months with a history of long feeding with improper foods, especially the use of condensed milk without whole milk or fruit juices. The pain on motion, loss of function and swelling of the legs, the ecchymoses, bleeding gums and hematuria are typical.

Two schools have developed as to the cause of scurvy. One claims that scurvy, rickets, beri-beri and pellagra are deficiency diseases and that certain substances, known as vitamines, are lacking. The other school holds that scurvy is of toxic origin and is either an intoxication or auto-intoxication due to the over-growth of harmful bacteria in the intestinal tract. The strongest evidence points to the deficiency theory, although there is much that points to a metabolic disturbance.

It is demonstrated that the vitamines are frequently stored in the body and delay the onset of scurvy after a vitamine-free food has been given for some time. Also that vitamines are not stable toward heat. Both of these points are important from the clinical side, one explaining the late onset of scurvy, usually in the third quarter of the first year of life, the protection being provided by vitamine received at birth from the mother; the other explaining why so many foods, if given alone, without an antiscorbutic, will cause scurvy.

All investigations show that raw whole milk contains a relatively small amount of vitamine and that it requires at least one pint of fresh raw milk daily to protect an infant. This small amount of vitamine can easily be reduced by heating and thereby cause a child to approach recognizable scurvy.

Condensed and evaporated milks are apt to produce scurvy, unless an antiscorbutic be given. Other proprietary foods containing milk that has been heated are apt to produce the disease. The only prepared milk food that escapes this criticism to any degree is dried milk.

Fresh fruits and vegetables have long been known to prevent scurvy and modern investigators have studied the relative values of these foods. Orange peel also has a high vitamine content. Of the vegetables, potato,

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(6) Archiv. Pediat., January, 1921.

boiled or mashed, is valuable. Cabbage, onion and turnip can also be used. One ounce of canned tomatoes given daily to an infant will prevent the disease.

The author reports several cases illustrating his points.

MISCELLANEOUS CONDITIONS

Acute Painful Swelling of the Mammary Gland in Older Children. G. Stern[7] states that mastitis adolescentium has been observed in children of both sexes usually between the age of 10 and 13 years, some of whom were still infantile, while others showed prepubertal or pubertal organic changes. Etiologically, the painful swelling is brought in relation with endocrine hormone action originating in the region of the germ glands. In a case examined histologically, pure hypertrophy and hyperemic swelling without inflammatory changes were observed. The frequent unilateral occurrence of the affection speaks against exclusively hormone etiology. Nervous influences are also a factor. In five cases observed by the author there was strongly positive Chvostek, marked dermographism, ovarian tenderness, nervous hyperexcitability, and orthostatic albuminuria. He concludes that nervous factors are of primary etiologic importance and that endocrine metabolic anomalies, which so far have been considered of greatest importance, are of only secondary importance.

Acute Osteomyelitis in Children. As a basis for this paper by D. B. Pfeiffer,[8] thirty-five cases have been collected from the records of the Surgical Service of the University Hospital covering a period of slightly more than ten years. The disease was seen to be more frequent in males and though it may affect the infant it finds its greatest incidence in the later years of childhood. Three cases showed multiple involvement. As a focus of this disease, the long bones greatly predominate but any bone which possesses a spongy medulla may become the seat of a typical osteomyelitis. The diploë of the skull, the bodies and spines of the vertebrae, the

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(7) Zeitschr. f. angew. Anat. u. Konstitutionslehre, 1920, vol. 6.
(8) Archiv. Pediat., January, 1921.

spongy interior of the scapula, especially of its spinous process, and even a sesamoid bone such as the patella have been reported as primary seats of osteomyelitis. In this series the tibia was involved slightly more often than the femur. In most large collections, the femur leads the list with the fibula a close second.

In about one-third of the cases, definite suggestions as to portal of entry were noted. It is obvious that osteomyelitis is a hematogenous infection.

The typical sequence is as follows: lowered general resistance, chronic or temporary, a focus of infection, bacteremia and arrest and localization of the microorganisms in an area of traumatic inflammation in the end of a long bone. One or several of these typical conditions may be lacking or modified in the individual case. Fever, rapid pulse, leukocytosis, often chills and sweats and other general symptoms of pyogenic infection are the rule. The mortality in the present series was 14.3 per cent. One patient died of septic pneumonia and four of the toxemia of sepsis. The average duration of treatment in the hospital was five months. In spite of this prolonged period, only four children were discharged cured. Five patients lost the entire shaft of the affected bone. Three lost, to a greater or less degree, the function of the knee, one of the hip and one of the wrist joint through suppurative arthritis.

The essential object of early treatment is prompt and efficient drainage of the affected medulla.

The author emphasizes the fact that acute osteomyelitis belongs to the domain of emergency surgery; present experience shows too often errors in diagnosis, delay in treatment and insufficient primary operative procedure. With due allowance for individual resistance and virulence of infection, the mortality and morbidity of this disease vary inversely with the promptness of diagnosis and treatment and directly with the efficiency of drainage at the primary operation.

Use of Silver Nitrate Ointment in the Treatment of Vulvovaginitis in Children. G. Gellhorn[9] employs silver nitrate in the form of a 1 per cent. ointment (silver nitrate, 1.0; lanoline and white petrolatum, of

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(9) Jour. Amer. Med. Ass'n., Dec. 11, 1920.

each, 50.0). This ointment is injected into the vagina through an ordinary glass syringe with a slender nozzle to which a piece of soft rubber catheter or tubing about 3 inches long, is attached. The tubing is changed for each patient. It can be introduced without pain into the vagina of even a very small child, and is slowly pushed inward the entire length of the vagina. The latter, then, is very slowly filled to capacity with the silver salve. The excess of salve which oozes back through the hymenal opening is not wiped off, as it is meant to cover and protect the irritated vulva and its surroundings.

The treatment is given once a day, without any additional douching. Every seventh or eighth day, after a day of rest, a smear is examined, and the injections continued if gonococci are present. If they are absent, smears are made at intervals of three days without further treatment until at least three days have been found negative. It is then advisable to send the child home; but the physician should insist on a final examination in two weeks. Occasionally, provocative silver nitrate injections are made and smears examined subsequently.

As a result of this treatment, the discharge and the outer excoriations, as a rule, disappear very quickly. In some cases, a scant, watery discharge persists for a short while which may harbor gonococci. The average duration of treatment is from three to four weeks.

When there is a return of gonococci in the smears after a temporary absence, or when the discharge can not be freed at any time from the microbes, one must assume that, contrary to the usual behavior of the disease in childhood, the gonococci have invaded the cervical canal. Instances of such an ascending gonorrhea with the formation of pyosalpinx or pelvic abscess are well known though they are not frequent.

The 1 per cent. silver nitrate salve has been used in the author's service at the St. Louis City Hospital on children ranging in age from 9 months to 12 years.

Ulcerated Meatus in the Circumcised Child. J. Brennemann[1] states that ulceration of the meatus is very

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(1) Amer. Jour. Dis. Child., January, 1921.

common in circumcised children. There is usually ulceration, scab formation, narrowing of the meatus, painful urination, often partial obstruction, and occasionally hemorrhage at the end of urination. The condition seems always associated with what is known as the "ammoniacal diaper," and apparently results from direct contact of the meatus with the wet diaper. The treatment consists in applying vaseline or wet boric acid dressings to the meatus, if inflamed, and in the prophylaxis of the ammoniacal diaper. The latter is probably due to a metabolic disturbance that is not yet fully understood, but probably commonly due to over-feeding with cow's milk fat as a result of which there is an excessive excretion of ammonium salts in the urine. Inasmuch as the ammonium salts must be broken down to liberate ammonia and this is commonly effected by an alkali, it is well in addition, to reduce the ammonium content of the urine, to rinse the diapers to remove all excess of soap and also to boil them for a long time to eliminate the possible influence of bacterial action.

Insufflation of Stearate of Zinc. N. Barnett[3] reports the case of a female child 10 months old, who on Feb. 27, 1920, while playing with the stearate of zinc jar, poured half the contents down her throat. She immediately became cyanotic and limp, and when seen, ten minutes later, was cyanotic with irregular respirations and short hacking cough. She was stuporous at intervals for several minutes. Attempts to induce vomiting by hot bicarbonate solution and aromatic spirits of ammonia brought up only some frothy mucus.

February 28: The temperature rose to 101.6° F. Child was drowsy. There was a hacking cough, slight cyanosis; diffuse fine râles over both lungs.

February 29: Temperature was 101.6° F. in the morning. Child was brighter and took a little food. Fine râles both bases, more on right side. At 6 p. m. temperature was 101° F.

March 1: Child had a good night. Slight cough. Color good. She was eating well. Râles were heard only

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(3) Archiv. Pediat., January, 1921.

at the angle of the right scapula. Temperature was 99° F. a. m.; and 99.8° p. m.

March 2: Temperature 98° F. No cough. Chest entirely clear.

The interesting features of this case were: (1) The intervals of stupor; (2) the rapid development of a diffuse capillary bronchitis; (3) the disappearance of all signs within three days.

Bromine Poisoning through Mother's Milk. The case of a 6-months old nursing baby who presented a papulopostular eruption, principally on arms, legs and buttocks, is reported by F. Van der Bogert[4]. The mother had been taking a proprietary preparation containing bromides. Examination of the breast milk revealed bromine in "more than traces."

Bogert reviews the literature on the excretion of bromides through mothers' milk. The opinions vary but seem to indicate that the excretion of bromides in breast milk is not unknown.

Hypertrichiasis in Childhood: The So-Called Dog-Faced Boy. F. C. Knowles[5] reports the case of a 3-year old boy whose head was covered with a very heavy growth of coarse black hair, extending over the forehead to the eyebrows. The eyebrows were unusually heavy, the eyelashes quite long, black and bushy. There was a heavy growth of hair of a fine consistency extending over the cheeks. There was a heavy growth of soft black hair, in many places an inch or more in length, extending over all portions of the back, the arms, the legs, the abdomen and the chest (Plate I).

Hypertrichiasis universalis is very rare, while the acquired form, or hypertrichiasis partialis, is very common. In the universal form, hair is found generally excepting in these areas where this growth never occurs such as the palms of the hands, the soles of the feet, the backs of the last phalanges of the fingers and the toes, the inside of the labia majora, the prepuce or on the glans penis. Accompanying this excessive hirsute growth there is usually combined a deficiency of teeth, especially

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(4) Amer. Jour. Dis. Child., February, 1921.
(5) Penn. Med. Jour., March, 1921.

marked in the upper jaw. Localized and partial cases of hypertrichiasis are most frequently met with in the sacral or lumbar region and not infrequently are associated with spina bifida. The cause of hypetrichiasis in many instances is extremely obscure. In universal hirsuties heredity plays an important part.

A Case of Hemihypertrophy. E. G. Hall[6] reports the case of a female infant of 7 months who presented a bulged and swollen appearance of the right cheek and lip, ear and right side of the tongue. The right mamma, abdominal parietes and labium majus were considerably larger than the left. The right arm was slightly longer than the left, its circumference equal. The right leg was obviously longer than the left and its girth larger. The right foot was also longer and more fleshy than its fellow. The general appearance was that of a greatly increased development of subcutaneous fatty tissue.

In commenting on this case, F. P. Weber discusses five similar cases reported in the literature.

Torsion of the Testis in an Infant. A case of torsion of the testis in an infant five days old, in which operation was performed and the infant made a good recovery, is reported by W. G. Nash[7]. Including this case six had been reported within fourteen months, which appears to be an unusual proportion. These cases show the liability of torsion occurring in infants. It is probably the only cause of acute inflammatory swelling in the scrotum in early life.

Case of Idiopathic Hemorrhagic Sarcoma of Kaposi. Stafford McLean[8] reports a case of a Jewish child of 5½ years. About seven months previous to admission to the hospital, a purple spot about the size of a thumb nail appeared on the left cheek. This grew very slowly, and at the end of three months it was about the size of a silver quarter, the color remaining the same. Shortly afterward, the whole right cheek gradually became swollen and discolored. About six weeks after the spot was first noted on the left cheek, the father noted the appearance of other spots on the buttocks, hands, arms, legs, feet and body.

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(6) Brit. Jour. Child. Dis., January-March, 1921.
(7) Brit. Med. Jour., Feb. 19, 1921.
(8) Amer. Jour. Dis. Child., May, 1921.

On examination, the child was found to be moderately well-nourished and well-developed. The mucous membranes seemed markedly anemic. Both cheeks were greatly swollen and hard and tense to the touch. There was a symmetrical deep purplish discoloration of the face not limited to the swollen cheeks but extending above to the lower lids and below to the lower lip and chin. On the left side of the face there was a marked induration extending to the cheek.

There were a number of subcutaneous masses, not sharply outlined, over the frontal region, and a few spots on the scalp about the size of a pea, all of which were purplish in color. There were also a few spots on the upper chest and extensor surfaces of the arms and forearms which were apparently in the fading stage. Over the thighs and buttocks there were some spots similar in character to those on the chest and arms, one of which was indurated. All the superficial lymph glands were slightly enlarged. A marked systolic murmur limited to the cardiac region was heard. It was evidently a hemic murmur.

The blood picture showed 25 per cent. hemoglobin, 1,288,000 red blood cells, with marked variation in size and shape. White blood cells 2,400 with small lymphocytes 52 per cent. A number of blood examinations were made, each showing a progressive decrease in the total number of red cells, the count falling to 552,000 the day before death. In both eyes pallor of the optic nerves and depressed retinal circulation were found. A low grade of retinal atrophy was present. The child seemed moderately comfortable, except for the cough, with occasional attack of dyspnea and, at times, pain in the left side of the face. The swelling of both cheeks became progressively more marked. Numerous new areas, averaging the size of a pea, appeared on the chest and extremities and a patch the size of a nickel was noted on the scrotum. The most striking change in the child was the rapid increase in the size of the cheeks.

Death occurred twenty-four days after admission to the hospital, apparently from anemia with a terminal bronchopneumonia.

This disease has infrequently been noted in children.

Orthopedic Surgery

BY

EDWIN W. RYERSON, M. D.

WITH THE COLLABORATION OF

ROBERT O. RITTER, M. D.

ORTHOPEDIC SURGERY

GENERAL CONSIDERATIONS

The Teaching of Orthopedic Surgery. The time has come for some changes in our methods of teaching. The Committee on Education of the American Medical Association became active along this line during the latter part of 1920, and took definite steps toward the standardization of medical and surgical teaching. Sub-committees were formed to represent the different divisions and special departments, in drawing up tentative schedules of the requirements which in their judgment, should be met by those who might desire to be considered qualified to practice along especial lines. These sub-committees were called committees on graduate training in the different specialties. Orthopedic surgery was represented by Drs. Robert W. Lovett, Chairman; Edwin W. Ryerson, secretary; Nathaniel Allison, Albert H. Freiberg, Emil S. Geist, John L. Porter, Reginald H. Sayre, Henry L. Taylor, and William S. Baer. These men held a meeting on December 31, 1920, and January 1, 1921, and drew up a set of resolutions which were the result of prolonged and careful discussion. Summarized, they are as follows:

The minimum requirements (note that the word is *minimum*) for those who desire to call themselves "Orthopedic Surgeons" shall be:—

1. Standard medical school course in a Class A school, four years.
2. Surgical interneship of at least one year.
3. Graduate course, one year as interne on service devoted entirely to orthopedic surgery.
4. Six months in allied studies, physiotherapy, shop work, and schools for cripples.

Although this minimum was regarded as reasonably satisfactory, the committee felt that more graduate work than this would be highly desirable in almost all cases, and it recommended a three-year course leading to a graduate degree, or else, and perhaps more desirable, an assistant-ship to a qualified orthopedic surgeon.

All this is for graduate students who desire to become orthopedic specialists.

The question of undergraduate orthopedic teaching has been well considered by Nathaniel Allison,[1] Dean of Washington University Medical School, in a paper read at the meeting of the American Orthopedic Association in June of this year. He states his position as follows:

"I believe that so-called orthopedic surgery differs in none of its principles from so-called general surgery. I believe that the part can not be greater or more important than the whole, and I further believe that surgery is more important than orthopedic surgery. In consequence, I believe that surgery should be taught the undergraduate medical student without any qualifying or hyphenated characteristics."

Farther on, he says that the undergraduate student should be instructed in *surgery*, and that that part of surgery which falls into the hands of the orthopedic surgeon should be taught by the orthopedic surgeon. The student should be guarded against the "specialist" point of view. He should be made to feel that "the organism is greater than the organ," and that surgery is surgery, irrespective of how many divisions are made to facilitate the proper handling of the surgical cases. He thinks that the teaching of surgical diagnosis should be stressed more than that of surgical treatment, and that orthopedic surgery should not be taught as orthopedic surgery, but that the orthopedic surgeon should teach the undergraduate students certain phases and problems of surgery. He thinks that didactic lectures are less valuable than demonstrations, but that a demonstration should be of a principle rather than of the demonstrator's skill. Clinical conferences, carried on with frankness and informality, are of great value.

He defines orthopedic surgery in the words of Sir Robert Jones:

Fractures, recent, malunited, and ununited.

Congenital and acquired deformities of the extremities.

Paralyses of the extremities.

Diseases, derangements and disabilities of the joints,

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(1) Jour. Orthop. Surg., September, 1921.

including the spine, wry-neck, and those conditions included under the general term "bone-setting."

[This latter term does not convey anything very definite to some of us, and itself needs to be defined in order to be comprehensible.—Ed.]

The ultimate restoration of function is, after all, the goal of the orthopedic surgeon, and a vigorous attempt has been made to introduce this as the "slogan" of this special field of surgery; but what, then, is the goal of the oculist, or the medical practitioner, or the veterinary surgeon. No, the orthopedic surgeon can claim no patent rights on the "restoration of function." Nevertheless, Allison likes it so well that, after two pages of excellent and profitable discussion, he gives his own definition of orthopedic surgery in these words:

"It is simply this, — the surgery of the extremities and spinal column, which has the re-establishment of function as its guiding principle."

In discussing this paper, Dr. Charles F. Painter stated that he believed it would be for the best interests of the medical schools themeselves, as well as for the public, if the departments of surgery should be uniformly organized so as to have the Professor of Surgery chief of all the surgical specialties, having the heads of the special departments under him with the title of Assistant Professor in the various sub-departments.

Reconstruction Surgery and Its Application to Civilian Practice. An important paper on this subject is presented by C. L. Starr,[2] emphasizing especially the importance of considering ultimate function rather than restoration of the contour and anatomic structure of a part, as for example, in loss of the shoulder-joint where ankylosis in good position will give better results than attempting an arthroplastic operation to restore motion to the joint.

Bone Sepsis. The extensive operations practiced in the later years of the war resulted in many non-unions of bone, with more or less infection. The best way of treating these while the infection is still active is to excise widely the sinuses and all foreign tissue, leaving the wounds wide open, with the over-hanging walls

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(2) Surg. Gynec. and Obstet., April, 1921.

chiseled away, so that the wounds can be packed and caused to fill from the bottom. At least six months to one year must elapse before attempts are made to repair the bony structures. Two-stage operations are probably advisable, the first operation simply removing the soft tissue scar over the bone and preparing the site for the bone graft. In general, the inlay graft as advocated by Albee has proved the most satisfactory. The intramedullary graft is scarcely ever applicable. The homogeneous graft is preferred, not because it is a very active agent in osteogenesis but because it is more readily penetrated by osteoblasts and is not so subject to autolysis as foreign bone. A method of employing the inlay graft, which is favored by Starr, is by cutting the graft into a diamond-shape and then splitting the recipient bone to receive this graft. In large bones it may be necessary to cut a V to receive the graft, but in bones like the ulna and radius a simple split will suffice. In many cases no suture or bone peg will be necessary.

Infections and injuries to the joints likely to result in ankylosis should be placed in proper position for best functional use; the shoulder-joint in abduction of about 45 degrees, with the elbow slightly in front of anterior axillary line; the elbow-joint, if single, at flexion of 110 degrees or slightly straighter than a right angle; if double, one arm, preferably the left, at 120 degrees of flexion and the other, the right, at 75 degrees, or slightly more acute than a right angle. If pronation and supination are lost the forearm should be placed in slight pronation. The wrist-joint should be well-hyperextended. The hip-joint should be in abduction and flexion of about 15 degrees. The knee-joint should be straight in all workers, and only in very exceptional occupations, such as professional callings, should any flexion be permitted.

Muscles and Tendons. Tendon transplantations are extremely satisfactory when performed for irreparable musculospiral nerve lesions. The pronator radii teres is inserted through the extensor carpi radialis longior and brevior, the wrist being hyperextended to make it taut. The flexor carpi radialis is attached to the four common extensors at the wrist. The palmaris longus is attached to the three extensors of the thumb. Care must be taken to scrape the sheath completely off from the tendons to be transferred, after which they are sutured into a split in the recipient tendons and double stitched with linen. At the end of three weeks muscle training is begun.

Nerve Injuries. The best results in late nerve sutures have been in the musculospiral and the sciatic nerves; the poorest in the ulnar. The reason for the greater percentage of failures in the mixed nerves has probably been due to our inability to coapt similar areas in the proximal and distal ends so that motor axones will find their way into motor areas and sensory axones into sensory areas. Nerves sutured early after injury have done better than the ones sutured long after injury. Primary suture in the presence of infection very rarely results in recovery without a second operation for removal of scar tissue from the nerve. This, however, is not an argument against primary suture when the end of the nerve can readily be found at the time of early debridement or drainage operation. The primary operation serves to keep the ends approximated and they are thus more readily found at secondary operation. It also maintains the length of the nerve and long gaps are not so frequent. It is of no use to use materials, such as fat, fascia, Cargile membrane, or tube of vein. The sutured nerve should be laid in a bed of clear muscle tissue when possible. The writer has seen no cases of recovery where gaps have been bridged either by nerve grafts, by tubulization or by connecting the ends by catgut strands.

DISEASE AND INJURIES OF THE SPINE AND RIBS

Tuberculosis of Spine. R. Tunstall Taylor[3] publishes an article entitled "Reminiscences in Bone Surgery, with Special Reference to Pott's Disease."

After operation on cases of spinal tuberculosis by the methods of Albee, Hibbs and others, we must not expect, he says, immediate cure unaided by mechanical fixation. The operative procedures are to be regarded

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(3) Southern Med. Jour., October, 1920.

as adjuvants that shorten the duration of necessary treatment. Mechanical fixation is just as essential and important as formerly. Taylor has modified the original spinal brace of C. F. Taylor, and added two lateral uprights (not crutches) which join the medial uprights at the top and afford rigidity, at the same time preventing posterior bulging of the ribs and lateral compression of the thorax. In cases of disease above the eighth dorsal vertebra a form of head-support is always used. This consists of a prolongation of the central uprights upward to the occiput, with an occipitotemporal headband with straps going around the forehead and under the chin (Plate II).

Besides operative and mechanical fixation, all patients who can do so receive out-of-door treatment in every kind of weather. Those having the greatest exposure to sunlight were found to make the most rapid improvement. Since 1904, Koch's old tuberculin (O. T.) has been given in very small doses, never sufficient to produce any local or systemic reaction.

Operative and Non-operative Treatment of Tuberculosis of Spine. C. A. Stone[4] has investigated the results in thirty-three cases in which operation was performed, and in thirty-two in which only conservative treatment was employed. He was impelled to undertake this comparison because he noticed that the operative cases were not doing so well as reports had led him to believe that they ought to do. None of the patients was over 14 years of age.

Eight operations of the Hibbs type were done, and twenty-four after the method of Albee. In four of the Hibbs cases (or 50 per cent.) the children developed abscesses at some period after the operation. In ten of the Albee cases (or 41.6 per cent.) the patients developed abscesses. One child died of shock on the day of operation. Two children died within three months, of tuberculous meningitis. A fourth died a year after operation. Another went to a different hospital where, under anesthesia, a fairly large kyphos was forcibly straightened and the child promptly died. One child developed total paralysis of both legs 1½ years after operation.

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(4) Jour. Mo. State Med. Ass'n., September, 1920.

In the non-operated series, only one child died. This was a sudden death, with no autopsy; the cause of death is not known.

Conclusions: 1. In about 19 per cent. of cases treated in the usual conservative way the patients developed abscesses.

2. Over 42 per cent. of the children operated on developed abscesses.

3. Operation has not prevented increase in deformity.

4. After-care must be carried out during as long a time following operation as if nothing had been done.

5. The mortality in the operative cases was 15 per cent.

6. Ankylosing operations for tuberculous spines in children are not to be recommended.

[It is hardly fair to include in the mortality percentage the death of the child who had a forcible correction of the deformity performed at another hospital with an immediately fatal result. Statistics of this kind have no scientific value. The case in which death occurred a year after operation is not explained in any way by the author. So far as the reader knows, the cause of death may have been scarlet fever or diphtheria. The Editor holds no brief for the operative treatment, but he believes that it is of material service in many cases, even in some children below the age of fourteen years. He contends that it does not subserve any useful purpose to present a report which is so manifestly unfair as this now under discussion. No one denies that any method of treatment which involves a rather long and somewhat bloody operation under general narcosis is certain to be attended with a definite mortality. The thing which we all are anxious to discover is whether or not the probable gain is worth the possible risk. The occurrence of two fatal cases of tuberculous meningitis within three months after operation is very significant, and has been observed in other clinics. The death from shock on the day of operation is directly chargeable to the operation, and is a legitimate risk. It is by no means the only death from shock which has followed ankylosing operations upon the spine. The point which is objected to in Dr. Stone's paper is the failure to present a careful analysis of his results. He is perfectly correct in stating that in the operated cases the patients need long and careful mechanical treatment after the operation. What is imperatively needed is an investigation to show whether or not the children operated on are less likely to have the late recurrences in after years which are so dangerous and frequent a menace to those treated by conservative measures. It seems to the Editor that a bony ankylosis of the posterior portion of the spine in the region of the diseased area can not fail to be a distinct advantage. Unmixed tuberculosis in the spine shows very little tendency to produce ankylosis, if we may judge by its behavior in the knee and hip. A knee-joint tuberculosis, for example, may exist for many years, with extensive gross destruction of cartilage and bone, and yet fail to produce bony ankylosis. So long as such a knee remains movable, it is subject to frequent exacerbations, and does not get well. If, now, a bony ankylosis be produced by operation, or by secondary invasion of pus-producing bacteria, the tuberculous infection will disappear much more rapidly, with a much better prospect of ultimate cure.

It is logical to think that the same process will occur in tuberculosis of the spine. There is little or no tendency in Pott's disease toward the production of bone or of bony ankylosis. The usual trend is toward the destruction of bone. It is very difficult for Nature and the tubercle bacillus to form a bony fusion of the diseased area. Many of us believe that unless such bony fusion can be formed, the patient will always be in danger. Why not, then, make the attempt to fasten the vertebrae together so that the patient may make a permanent recovery? We must not make this attempt if it involves too much risk. The cases must be carefully selected, (which has not always been done in the past) and the operation, of whichever kind, must be rapidly and skillfully performed. It is not to be advised in young children; but in older children in whom long post-operative treatment can be carried out, and in adults, it seems to the Editor that it has a very definite value.—ED.]

Treatment of Tuberculosis of the Spine. Early diagnosis and careful prolonged care under competent supervision are essential, says H. W. Meyerding,[5] to favorable results in tuberculosis of the spine. The surgical fusion of Hibbs and that of Albee have given better results in a definite group of cases than conservative treatment, thus placing these operations on a sound surgical foundation in the treatment of the disease.

Of 405 cases treated in the Mayo clinic, the disease was located in the high dorsal region in 2 per cent.; mid-dorsal in 14 per cent.; low dorsal in 27 per cent.; dorso-lumbar in 11 per cent.; and lumbar in 46 per cent. Previous treatment had been unsatisfactory, consisting of casts and braces.

The most favorable results are obtained, Meyerding thinks, by a proper selection of patients and the continuance of conservative treatment after operation until the disease process has been arrested. The bed treatment is followed by a plaster-of-Paris cast which in turn is followed by a Taylor brace. The author resorts to bone-graft surgery when the general condition has improved but the symptoms of spinal disease remain un-arrested.

Casts and braces, when applied properly, support the weight above the diseased area, allow breathing space, hyperextend the spine, and afford general support. The Rollier sunshine treatment, general hygiene and indicated medication and good nourishing diet are all urged while the patient is under control.

When the patient is free from muscle spasm, when his temperature is normal and he has a desire to move following operation, unless there is some contraindication he can be safely allowed up with a properly fitted brace.

The time of recumbency in the clinic is roughly given as one year in the conservative treatment while in surgical cases it is given as six weeks with cast or brace. The author thinks a cast fitted before operation, split and re-applied, is the best method of fixation in bed. Of the author's patients 86 per cent. were relieved of symptoms and with this statement he gives the following summary:

The fusion operations of Hibbs and Albee have given a means of internal fixation which shortens recumbency, prevents further deformity, and tends to hasten the healing of the disease.

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(5) Minnesota Med., May, 1920.

The disease process is not eradicated and relief of the symptoms does not mean cure of the disease.

The value of general anti-tuberculous measures is of primary importance and should be insisted on.

Recumbency and external fixation are still necessary.

Abcesses should be let alone unless they cause discomfort or pain or become secondarily infected, when they should be carefully aspirated and injected.

A primary focus indicates a general disease of which the spinal symptoms are manifestations.

Children under 5 years and adults with active pulmonary lesions and sinuses are poor risks.

Paraplegia does not contraindicate operation for fixation.

Tuberculous Spondylitis. Fifty-three cases of tuberculous spondylitis were treated by H. Debrunner[6]: twenty-nine boys, twenty-four girls. The ages ranged from 1½ to 14 years. In twenty-two cases there was abscess formation; and four cases showed purulent fistula prior to operation. The general state was mostly unfavorable, and often bad. In thirty-five cases, the tuberculous spondylitis was manifested in the breast region; between the thoracic and lumbar regions in thirteen; in the lumbar region in four; in the lumbosacral region in one.

The following table summarizes the conditions before and after treatment by the Albee method:

Duration of observation of case.	No. of Cases	Recovered	Improved	Not Improved	Died
4 years and more....	7	7	—	—	—
3 years.............	9	5	1	2	1
2 years.............	9	9	—	—	—
1 year..............	11	—	5	3	3
4 months to 1 year...	9	—	8	—	1
3 months...........	8	—	Six of these are pain-free; 1 child of 2 years lies in plaster cast; 1 shows purulent fistula.		
Total..........	53				

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(6) Archi. f. Orthop. u. Unfall-Chir., 1921, vol. 19. From the Gocht Orthopedic Clinic, Berlin.

Leaving the last eight cases out of the question, twenty-one out of forty-five patients recovered. Of the improved cases twelve patients are pain-free and no longer wear a supporting corset; two of the improved cases show a diminishing fistula.

The five deaths occurred three, five, eight, thirteen, and thirty-seven months after the operation, and were due: to meningitis, two cases; to pulmonary tuberculosis, two cases; to kidney tuberculosis and amyloid degeneration, one case; mortality 11.1 per cent. The study of these fatal cases shows that four out of the five cases displayed tuberculosis of the organs prior to operation; and in the fifth case there was paralysis in both legs which was not improved by operation. They were all old and advanced cases, and not good operative risks.

As regards post-operative treatment by heliotherapy and sea and mountain air, Debrunner is of opinion that without proper fixation of the patient heliotherapy and mountain air count little.

The author collects 112 cases reported from literature by Thomsen, Fromme, Wiesinger, Goerres, Tuffier, and others and finds the reported results to be:

Cured	81. per cent.	—As an average
Improved	2.7 per cent.	
Not improved	5.4 per cent.	
Dead	10.7 per cent.	

Abscesses, fistulas and evidence of mixed infection are absolute contraindications; if there is severe paralysis artificial ankylosing or a laminectomy (simultaneous) is the appropriate method; the site of the tuberculous process does not influence the indications. The age plays some part as children under 4 (from 3 to 4 years old) show better results than those over 4 years. A relative contraindication is given by very extensive gibbosity.

Non-operative Treatment of Scoliosis. W. Truslow[7] writes an excellent and well-illustrated paper on the non-operative treatment of scoliosis. He considers that uniform and regular measurement and numerical record of the elements of deformity are important as guides to

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(7) Jour. Orthop. Surg., May, 1921.

treatment and as indicating elements most needing correction. A balanced use of corrective plaster-of-Paris jackets, of retention braces, and of intensive exercises is essential to satisfactory results. The position of the patient when the plaster jacket is applied is responsible for improving body posture and shoulder carriage. The successive paddings of the jacket are responsible for the care of the spinal deviation and rotation. His methods of measuring and recording spinal deviation are described and illustrated and his exercise technique is fully covered. The article is written by a man of wide experience and of great ability and will repay perusal in the original by any one who follows work of this kind.

Treatment of Scoliosis. S. Kleinberg[8] thinks that the failure of Abbott's method of forcible correction of structural scoliosis has been demonstrated, and that simpler methods should be adopted. Continuity of treatment is necessary. In 60 or 70 per cent. of all cases the deformity can surely be prevented from growing worse, and in most instances can be markedly improved. This will require at least five years, and perhaps much longer. This must be strongly impressed upon the patient and the parents. Gymnastic exercises are inefficient, and are sometimes harmful from the tendency to rely upon them and to delay corrective treatment.

The principles of corrective treatment are as follows:

1. Support of the trunk by an apparatus, usually a plaster-of-Paris jacket.
2. Change of the patient's posture to one directly the opposite to that of the deformity.
3. Fixation of the pelvis and the shoulders, and application of corrective force over the convexities.

The patient is suspended in a Sayre sling, with the heels touching the floor. In a case of right dorsal convexity, the left arm is then raised and the hand grasps the right side of the cross-bar. The hollow side of the back is padded with felt so as to be symmetrical with the other side. This padding is removed after the jacket has been completed. A traction band pulls the pelvis to the right. Another band pulls the convexity of the chest to the left, and a third fixes and pulls the upper

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(8) Surg. Gynec. and Obstet., April, 1921.

chest and shoulder toward the right. The body is padded with thin felt, and extra pads are placed under the traction bands and over the bony prominences. The right shoulder is pulled downward and backward by an assistant, as in Forbes's "paradoxical" position. A plaster jacket is then applied with reinforcements over points of especial strain, and a large window is cut over the left back. This jacket is worn for from four to eight weeks, or until the chest has filled out in the left back region.

In changing the jacket, the patient is suspended before the jacket is removed, and is washed and prepared without being allowed to resume the deformed position for an instant. These jackets are comfortable, at least after a day or two, and are not unsightly. The children can wear ordinary clothes, and are able to go to school without feeling conspicuous. No intermission is given during the hot weather of summer. There must be no opportunity for relapse of the deformity.

[This is a sane and well-considered discussion of a subject which during the period of the war was allowed to lapse into comparative obscurity. The scoliotics, like the poor, we have always with us. We have all tried earnestly to solve the problem of structural scoliosis. We have all become convinced that the problem has not yet been solved. Only a few years ago, Abbott thought that his method would offer a practical certainty of correction, but this hope has gone the way of all others. He believed that by forcibly flexing the spine, the articular facets of the vertebrae would be unlocked and that the rotation deformity could then be corrected by the pull of straps exerted against the projecting portions of the thorax and maintained by plaster jackets. Time has shown that such correction was only apparent and not real, and the difficulty and discomfort of the method were not justified by the results. This was demonstrated by the committee of the American Orthopedic Association, who made an exhaustive examination of Abbott's technique and actual cases, and reported adversely. The position of forced flexion of the spine is undesirable for many reasons, and it is now the view of most orthopedic surgeons that extension gives at least equally good results and is much better tolerated by the patients. It is acknowledged that we can not cure structural rotary lateral curvature by any method in use at the present time, but we can, by painstaking and persistent effort, prevent the increase of the deformity and make the spine and torso look a great deal straighter. This, in itself, is well worth doing. The difficulty is that an enormous amount of time and enthusiasm are necessary, as well as a high degree of ability in handling the mental and psychological aspects of the patient and the parents. It is no trifling ordeal for a young girl to wear a plaster-of-Paris jacket day and night, winter and summer, for several years, especially during such an abnormally hot season as we have just endured. It is indeed possible that some permanent damage to the health might result from this form of treatment, and it would therefore be justifiable to substitute for the non-removable plaster jacket a celluloid jacket, perforated for ventilation, made over a torso. This, of course, is no new suggestion. It has been done for years by a few surgeons with good results. The greatest objection to its general use is the question of expense. It requires good technique and a great deal of time. To become thoroughly dried and seasoned, a celluloid jacket should remain on the model for about ten days. It can not be reshaped or altered, and must be discarded when its limit of correction has been reached. None the less, it is well worth the time and expense, and will make practicable the continuous treatment of scoliosis in all except the very hottest parts of our country. This whole plan of the treatment of scoliosis so well described by Kleinberg can be carried out very successfully by any conscientious physician in this country who will take the trouble to learn the proper method of using plaster-of-Paris. There are many small towns in the United States, and probably in other lands, where cases of scoliosis exist that can not be sent to a recognized orthopedic surgeon. In far too many instances these patients are neglected because the physician whom they consult does not realize that he himself could readily become sufficiently expert to handle such deformities with practically as good results as a "specialist." It is impossible for the parents of nine-tenths of the scoliotics in small communities to send these children to larger centers for treatment. Some man should be developed in each town who could do the work. This man could also take care of the fractures of the neck of the femur by the Whitman abduction method. If some one of the surgical supply houses would take the trouble to learn to make good plaster-of-Paris bandages it would help things along very materially. At present, it is impossible to buy a decent plaster-of-Paris bandage made by a commercial house. They simply do not care to make them.—Ed.]

Spinal Curves in Growing Children. E. H. Bradford[9] considers that in early cases of simple postural deformities light inconspicuous braces and straps will be sufficient to prevent increase in the deformity and in some cases will bring about cure. It is first necessary to make the spine flexible by exercises and to increase the muscular strength by exercises devoted especially to the weaker muscles. Plates III to V show the light and simple forms of apparatus used by this surgeon.

Localization of Spina Bifida in the Cervical Region. Spina bifida is sometimes situated in the inferior and middle cervical regions and exceptionally in the first and second cervical vertebrae. According to A. Feil,[1] following the non-closure of the laminae the anterior part of the cervical vertebrae alone exists. It may be due to some intra-uterine traumatism. Feil thinks that the anomaly is only relatively rare and that spina bifida of the first cervical vertebra often accompanies other regional anomalies which cause it to be confused with certain cervical monstrosities and Pott's disease.

Dislocation and Fracture of Cervical Vertebrae. M. Langworthy[2] reports a bilateral forward dislocation of the fifth cervical vertebra. There was no motor paralysis. The *x*-ray picture taken immediately was conclusive. Five and a half hours after the injury the patient was etherized. The method of Walton was followed, reducing first one side and then the other by flexing and rotating the head and neck to the opposite side. A distinct impact of reduction was felt and reduction was verified

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(9) Boston Med. and Surg. Jour., May 19, 1921.
(1) Prog. Méd., 1920, p. 510.
(2) Jour. Amer. Med. Ass'n., Feb. 12, 1921.

later by the *x*-ray. A plaster support was applied from the head to the shoulders and on the fourteenth day the patient was discharged from the hospital. At the end of the sixth week the plaster was removed. Ten weeks after the injury there remained only some soreness and stiffness at the base of the neck. Movements of the neck were normal in extent but somewhat weak and were improving at the time of the last examination.

L. A. O. Goddu[3] also reports a case of cervical dislocation with fracture. Both arms became paralyzed, no changes in reflexes. The Roentgen ray showed forward dislocation of the third cervical vertebra on the fourth. The patient was seen by Goddu four weeks after the injury and it was considered that an attempt at replacement of the dislocation would be fatal. Head traction of six pounds was applied for three days, when an attempt at manipulation was made. This manipulation immediately changed the rate of respiration, which had formerly been 45 a minute. [It is not stated whether the respiration became more or less frequent.] In forty-eight hours another manipulation was performed. The patient stated that the neck felt better. The next day he was able to use the right arm weakly. Four weeks later he was able to be up and dressed, can now use the arms in all directions and is improving. A Thomas collar was applied after three weeks of traction. The author feels that the manipulations had changed the relations between the third and fourth vertebral bodies. The patient later became able to work and has only slight limitation in rotation and lateral bending of the head.

W. K. Lindsay[4] also reports a case of fracture-dislocation of the fifth cervical upon the sixth. The patient had stiffness of the neck, numbness of the right thumb, and pain through the shoulders. This patient was not treated by manipulation or apparatus, but at the end of three months he was much improved.

[The prompt and courageous interference of Langworthy in the case which he reports was certainly more than justified by the result. Not many surgeons have been willing to undertake such interference, except in

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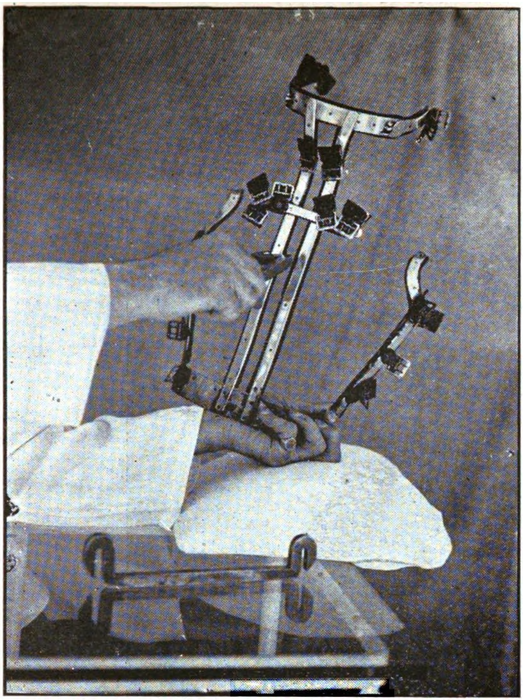
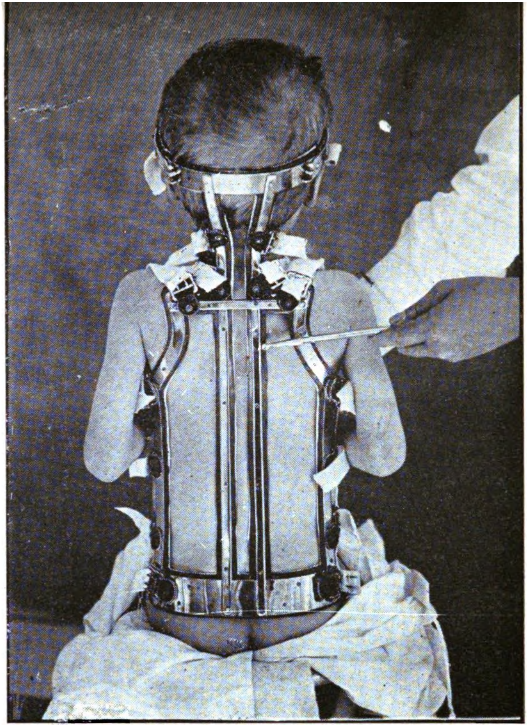
(3) Boston Med. and Surg. Jour., Feb. 17, 1921.
(4) Calif. State Jour. Med., November, 1920.

PLATE II.

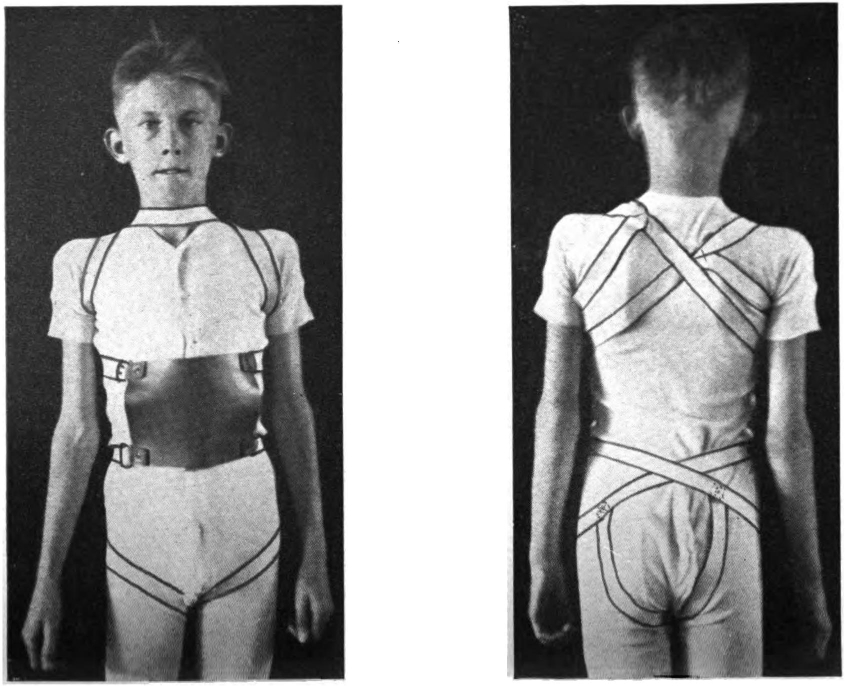


A. Method of bending and fitting central uprights with lateral uprights detached.



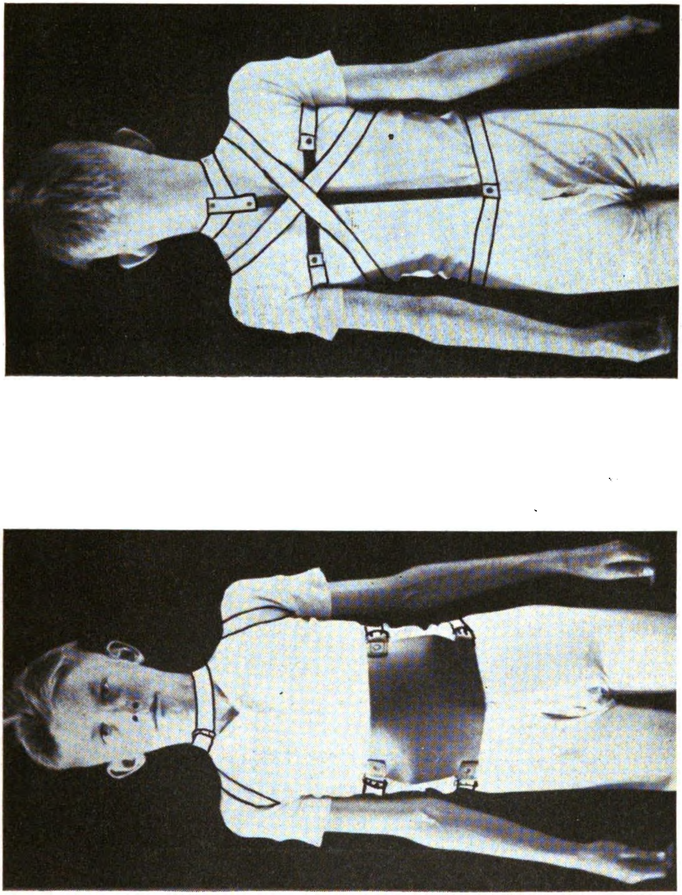
B. Author's brace applicable to cases of cervical, upper or mid-dorsal disease.—Taylor, page 197.

PLATE III.



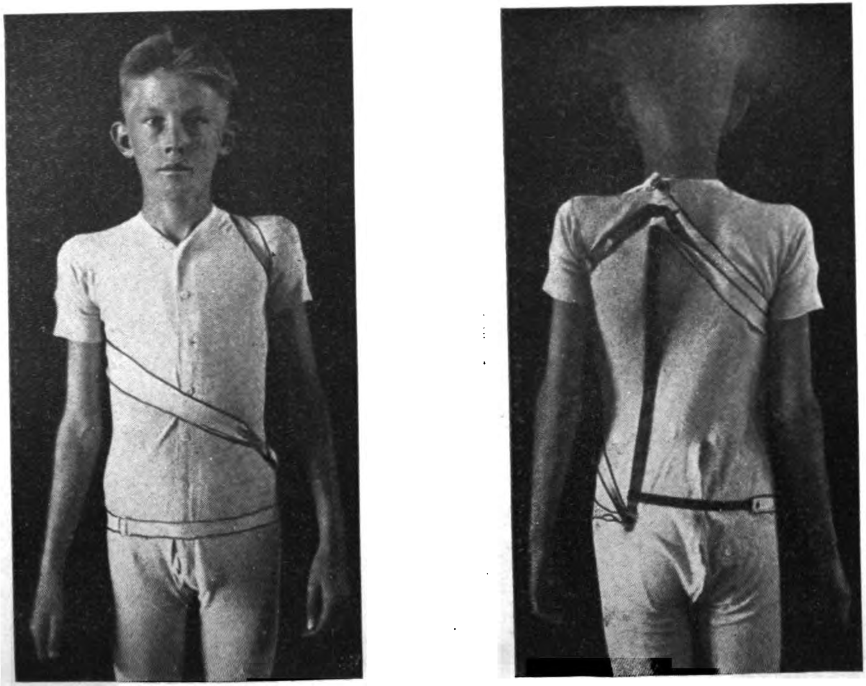
Round shoulder checkrein straps.—Bradford, page 207.

PLATE IV.



Round shoulder brace.—Bradford, page 207.

PLATE V.



Lateral curvature brace and spinal straps.—Bradford, page 207.

the cases of unilateral subluxation, so well described by Walton many years ago. The Editor has reduced several of these unilateral cases with great satisfaction. Several others which he has seen have reduced themselves either during sleep or during sneezing or coughing. The complete dislocations should usually have an attempt made at reduction, since when unreduced they frequently cause late symptoms in the peripheral nervous system. It is probable that the immediate use of traction to the head might be a valuable preliminary to manipulation and might in many cases of itself produce reduction.—Ed.]

Occipitalization of the Atlas and Congenital Torticollis. From the anatomic standpoint there is some similarity between sacralization of the fifth lumbar vertebra and complete or incomplete occipital fusion of the atlas.

According to A. Feil,[5] there are two types of occipitalization:

1. Unilateral, in which the first vertebra is fixed by one of its masses to the occipital;
2. Bilateral, in which the bone fusion is more pronounced.

The first occipitalized cervical vertebra usually rotates around its vertical axis; an important fact which explains some clinical symptoms. Very frequently this anomaly is accompanied by other vertical malformations; Bertolotti found six cases of cervical spina bifida in fourteen cases of occipitalization.

The clinical findings correspond to the two anatomic types. The unilateral form is the more interesting because it simulates torticollis, the head being inclined to the occipitalized side. There is limitation of movement, some kyphoscoliosis and asymmetry of the face. It is very difficult to diagnose between a muscular torticollis and a bony malformation torticollis.

Feil says that the clinician will be aided by the following facts: (1) deviation and rotation of the head is more marked in muscular torticollis; (2) in the bony torticollis the sternocleidomastoid muscle is not retracted; (3) congenital muscular torticollis exists from birth or shortly after, whereas the bony type does not appear for

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(5) Presse méd., 1921, vol. 29.

some years later. These findings will help to distinguish the congenital muscular torticollis from that of occipitalization.

Congenital Malformations of the Cervical Region. Anomalies of the cervical region, says A. Feil,[6] are not quite so exceptional as supposed. He gives the following schematic list of anomalies: Occipitalization of the atlas; cervical hemi-vertebra; cervical spina bifida; numerical reduction of cervical vertebrae; seventh cervical rib; congenital supra-elevation of the scapula.

The clinical aspect of each of these anomalies is discussed. Ledouble thinks that the weak spot in the cervical skeleton is found between the second and third cervical vertebrae, and Bertolotti has confirmed this in cases of anomalies seen by him. Bertolotti also insists on the extreme frequency with which occipital malformations accompany malformations of the cervical spine, and sees in this an argument favoring the vertebral origin of the cranium, or rather of the vertebral origin of the occipital bone.

Cervical anomalies are especially confounded with torticollis and Potts' disease; more rarely with rachitism or an old traumatism. Each anomaly has a more or less clear symptomatology of its own, and can, according to Feil, be distinguished, even apart from radiologic verification, from the pathological conditions referred to.

Absence of Cervical Vertebrae. Reduction in the number of the cervical vertebrae has been the object of researches by Klippel and Feil since 1912. Twelve such cases in which there is either absence or diminution in the number of the cervical vertebrae are given in the present article, one of them being a personal case of L. Dubreuil-Chambardel.[7]

Anatomically, the numerical reduction of the bones of the cervical column and their fusion into a single bone has been known a long time; and Rokitansky reported such an anomaly in 1844. The principal anatomic character of the syndrome is the absence of individual cervical vertebrae and their replacement by an osseous block which comprises either the whole cervical spine or only

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(6) Prog. méd., 1920, p. 301.
(7) Presse méd., May 4, 1921.

its superior part; or even, in certain cases, part of the upper thoracic spine. The second anatomic character is the presence of a long and wide triangular orifice occupying the posterior part of the cervical vertebrae from the head to the thorax. It is a true spina bifida and such a disposition has been observed in eight of the quoted cases. Nine of these cases were in males; three in females.

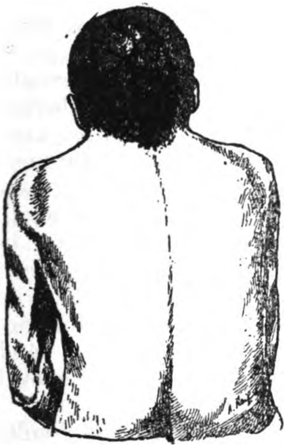

Fig. 3. — Patient of MM. Klippel and Feil. Note the absence of the neck, and the base of the hair line.

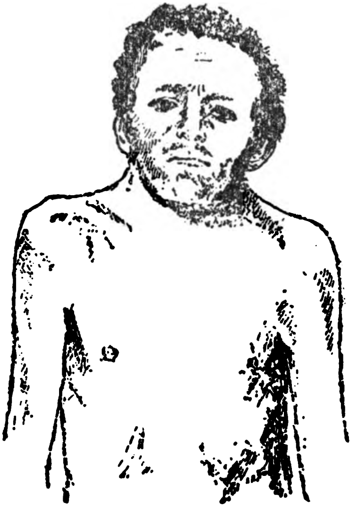

Fig. 4.—Patient of M. Bertolotti.

The cause is not clear. Clinically the findings are: Absence of the neck; limitation of movements of the neck; hair growing as far as the biacromial line. Also some scoliosis or kyphoscoliosis.

Cases of this kind are often diagnosed as suboccipital Pott's disease, but radiography should at once exclude this. In other cases the condition is confused with torticollis. The author advances no pathogenetic hypothesis as regards the origin of the Klippel-Feil syndrome. The condition is shown in Plate VI and in Figures 3 and 4.

Seventh Cervical Rib. A seventh cervical rib is found in about 2 per cent. of subjects but does not always give symptoms. Most authors consider it bilateral. Eckstein found it bilateral in twenty-four of thirty-five cases. Ledouble found unilaterality more usual. In twenty cases, seven were bilateral, eight left-sided, and five right-sided. The seventh cervical rib is found oftenest on the left side and more frequently in females. Anatomically, Ledouble classifies these supernumerary ribs as: (1) Osteocartilaginous or osteofibro-cartilaginous complete ribs; and (2) incomplete ribs represented by an anterior or posterior trunk. The complete and incomplete ribs are further anatomically subdivided according to their mode of articulation.

In a case reported by G. Bréchot[8] there was a seventh left cervical rib with compression of the subclavian artery and pain and muscular weakness in the upper arm. The rib was incomplete and united to the first thoracic rib posteriorly. The subclavian artery always crosses a seventh cervical rib when this latter is long enough, and its compression always disturbs the circulation in the arm; edema, cyanosis and thrombosis have been observed. Symptoms arising from pressure on the brachial plexus are also commonly observed. Radiography is indispensable. In treatment the rib and periosteum ought be removed. A subperiosteal removal ought not be done.

About sixty cases have been operated on. The results are not always satisfactory as the operation is not easy and owing to adhesions it is not feasible to liberate the subclavian artery and the brachial plexus. Bréchot thinks that an angular incision is best, the horizontal branch being subclavicular and the vertical branch following the anterior border of the trapezius as far as the superior angle of the supraclavicular fossa.

Backache and Anatomic Variations of the Lumbosacral Region. Archer O'Reilly[9] considers, from the examination of *x*-ray plates of 300 patients with backache, that large, fan-shaped transverse processes of the fifth lumbar are rather common in patients with backache. They are more common in the male type of pelvis. Spondylolisthesis of varying degree is probably more common than is usually supposed, as is also rotation and slipping between the lumbar and sacral articulations.

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(8) Progrès. méd., 1921, p. 246.
(9) Jour. Orthop. Surg., May, 1921.

Backache: A Consideration of Low Back Pain of a Mild Type. S. Epstein[1] says that mild cases of traumatic spondylitis are often seen as the result of blows on the back or falls, more or less severe. A few days' rest in bed is followed by a period comparatively free from pain. A few months later, in the same locality, the patient experiences a sudden pain while bending forward or lifting some heavy weight. Shortly after this a small kyphosis appears looking like that of Pott's disease. Here we have a post-traumatic softening of part of a vertebra, not by the tubercle bacillus.

In another class, patients suffer from infectious arthritis of the spine. Medication does no good and injections into the sacrum give no relief. These cases are due to a shifting of the trunk laterally upon the last lumbar vertebra. These patients are relieved promptly by the use of plaster jackets.

Backaches are said to be due occasionally to impingement of the lateral processes of the fifth lumbar vertebra upon the adjacent iliac bones. Unless stereoscopic plates be carefully studied these shadows overlap and lead some surgeons to remove the large transverse process. Epstein believes that the postoperative rest which follows after such an ordeal is the factor which cures the patient, and hopes that these excisions will be less frequent. He does not think that many cases of back pain are due to lesions of the sacro-iliac joint.

Diagnosis and Treatment of Disabilities of the Back. J. W. Sever[2] considers that postural strain may cause backache. These strains are not traumatic but are caused by constant muscular strain and over-use in an habitual bad position. Patients with marked hollow backs and with increase in the normal inclination of the pelvis, often present tenderness along the back muscles over the sacro-iliac joints. This is due to muscle strain and may be relieved by a proper support, by corsets, etc. Contracture of the Achilles tendons also may be a cause.

Many indefinite backaches which fail to clear up under ordinary treatment are relieved at once by raising the

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(1) Med. Record, April 30, 1921.
(2) Modern Med., February, 1921.

heels of the shoes. Sacro-iliac relaxation and displacement may exist and may cause back pain and sciatica. Spondylolisthesis or the slipping forward of the body of the fifth lumbar vertebra on the first sacral is not rarely seen. It may be static or traumatic in origin and usually leads to great discomfort. The treatment is adequate fixation, either by operation or by back brace. Osteo-arthritis, infections, new growths, etc., must be considered in diagnosing back pain.

Sacralization of the Fifth Lumbar Vertebra. M. R. J. Hayes[3] considers that unilateral or bilateral sacralization of the transverse process of the fifth lumbar vertebra may cause pain in the lower back. The site of the pain is variable but is usually in the lumbar region. It may radiate along the sciatic nerve toward the ischium or coccyx or into the groin. It produces pain on movement and rigidity, but this pain is not confined to the body of a single vertebra. The rigidity is less than in lumbar caries and the lateral movements and rotation are more limited than flexion and hyperextension contrary to what is observed in tuberculosis of the spine. Pain caused by sacralization comes on without any apparent cause, usually in a healthy young person. It persists or intermits with no reference to the general health. The results of radical treatment by excision of the sacralized transverse process have been uncertain. No case of complete cure has been reported. Palliative treatment by rest, electricity, *x*-rays and other physical therapeutic methods have given relief in the experience of many physicians.

Sacralization of the Fifth Lumbar Vertebra in Relation to Sciatic Neuralgia. Recent researches in France and Italy have shown that many sciaticas, the origin of which is doubtful, can be traced to a vertebral anomaly and especially to sacralization of the fifth lumbar vertebra. A. Feil[4] in seventy observed cases of painful sacralization noted more or less intense pain down the legs in twenty-six. A sciatica due to vertebral malformation may be bilateral or unilateral. Its character is not always clear-cut; but it is often quite possible to refer such a sciatica to sacralization based on the ex-

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(3) Dublin Jour. Med. Sci., April, 1921.
(4) Progrès méd., 1921, p. 133.

istence of a painful lumbar spot, on scoliosis, and on the age of the patient. The pain is felt in the vicinity of the sacralization, *viz.*, on pressure on the spino-iliac angle between the fifth lumbar and the posterior iliac tuberosity. Scoliosis or kyphoscoliosis more frequently accompanies unilateral sciatica. Sacralization sciatica usually is first manifested between the twentieth and thirtieth years. Feil thinks that the cause is the very late ossification of the posterior and lateral elements of the lumbosacral tract. When the clinical findings suggest sacralization of the vertebrae as the probable cause of a sciatica the physical signs of the malformation should be sought; a radiologic examination will verify the actual existence of sacralization, whether such be symmetrical or asymmetrical. The actual diagnosis must, however, rest on the clinical as well as on the radiologic findings.

Mechanical Influences in Sciatica. Sciatica, says E. W. Fiske,[5] is no longer to be regarded as a clinical entity. It will be found always that there is some underlying cause which is usually to be discovered in the lower portion of the spinal column or the pelvis. It is not to be denied that a true essential sciatic neuritis may be caused by a systemic infection, toxemia, or constitutional disease. On the other hand, the causes of local pressure on the nerve somewhere in its course would seem to be sufficiently numerous to justify a very serious consideration of the probable secondary involvement of the sciatic in every case. Intrapelvic diseases, neoplasms and displacements, must often cause sciatic pressure and pain, and hip disease, abscesses, or even a dilated colon may do so. At the origin of the nerve, however, is undoubtedly the most vulnerable point.

In twenty consecutive cases of sciatica which Fiske examined during the past year not one has failed to reveal an apparent primary cause in the low back. One case is reported in detail.

This patient had an intense pain in the posterior surface of the right thigh from buttock to knee. It had been present for about four weeks. Careful history taking revealed that a few days previous to the onset of acute

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(5) Penn. Med. Jour., June. 1921.

sciatica the patient had slipped while going downstairs and had turned quickly and grasped the railing. Some discomfort in the right buttock was felt at once and this gradually increased until he was obliged to go to bed four days later. Deep tenderness was felt in one place only, to the right of the fifth lumbar vertebra (right ilio-lumbar notch). All motions of the spine were restricted, with increased pain in the right sciatic, especially on bending to the right (homologous pain). Flexion of the straight leg and hyperextension of the thighs caused pain referred to the right sciatic notch. The right knee-jerk was absent and the right leg slightly atrophied. Roentgen-ray examination was negative. The diagnosis was made of mechanical derangement of the lumbosacral spine with secondary sciatica and scoliosis. The mechanism of the injury would probably produce a partial, if not a complete dislocation of the right lumbosacral articulation (the patient on stumbling had turned quickly to the left to grasp the stair railing). This partial or possibly complete dislocation of the right lumbosacral articulation did not remain dislocated—few of them do—but the symptoms and secondary inflammation of acute sprain persisted, followed by gradually increasing pressure on the adjacent lumbosacral cord and producing the secondary muscle spasm and deformity. On the basis of this diagnosis a manipulation of the low spine was performed by the writer. With the muscle thoroughly relaxed [probably under anesthesia—Ed.] a complete stretching of the muscles and ligaments of the lower spine and sacrum was produced by the forcible flexion of each extended leg on the pelvis, the pelvis being similarly flexed and extended on the trunk in the same manner. An attempt was also made by rotation of the pelvis on the lumbar spine to reverse the probable mechanism of the original trauma. The lumbosacral and sacral regions were then strapped very tightly with adhesive plaster, and a plaster-of-Paris shell was molded to the patient's back as he lay on his face with a pillow under the chest so as partially to extend the spine. The partly dried shell was then removed and padded and put back on the patient and he was turned over on his back in the shell and bound in. In the twenty-four hours following the manipulation, the patient had very little pain, all of this being in the lumbar spine. There was no pain in the leg nor did any symptoms of sciatica again appear. He was kept in bed in the shell for two weeks and then a wide reinforced belt was fitted to him. He was discharged at the end of a month with no deformity or pain and returned to his work one week later. The symptoms have never recurred.

In discussing this case it is to be remembered that this patient was treated for three weeks as a medical case. Blood tests and other complement tests were negative. Two per cent. novocain had been injected into the sacrum with slight and temporary relief. Salicylates and heat had been used. It is evident that the diagnosis and treatment of this case as instituted by Dr. Fiske were unquestionably correct. Several other cases are reported of somewhat the same type. In more than half of the twenty cases under consideration the diagnosis was made of sciatica secondary to sacro-iliac strain; in 25 per cent. of the cases lumbosacral lesion; in 15 per cent. muscular back strain with myositis and in two cases a possible infectious bone condition. In 40 per cent. the treatment was manipulation followed by fixation; in 60 per cent. fixation only. The theoretical explanation of these findings is not far to seek. The pain and tenderness in the back are symptoms of a local joint lesion, of which the deformity of scoliosis and the restricted painful motions on bending and leg tests are the usual concomitant, as in any joint infection. The absence of positive *x*-ray findings is quite typical of this class of back conditions, and does not rule out minor sacro-iliac or lumbosacral luxations, or the strains following transient displacements, which are far more common.

The secondary involvement of the sciatic nerve may be accounted for in several ways. Probably in the majority of cases there is a direct pressure on portions of the lumbosacral plexus, either from bone or infiltrated soft parts, the latter also being the chief factor in pressing on the lumbosacral cord as it crosses the face of the sacro-iliac joint. Nerve reflexes may also exist. The importance of secondary muscular spasm, which accompanies all joint lesions, must be considered as a factor in the maintenance of deformity and its secondary pain, including sciatica. Fixation and rest are the fundamental principles in joint disorders, whether infectious or traumatic lesions. More striking, however, is the result of manipulation under anesthesia. We are still somewhat in the dark as to the effect and results of manipulation on the spine, but it is certain that some definite changes can be produced by this procedure.

In the first place a very thorough stretching of the relaxed muscles puts a sudden end to chronic muscular spasm, with its secondary deformity and pain.

Second, minor displacement and luxation if they exist are very often replaced, or adhesions broken up, merely by a series of free, forced movements unguarded by the muscles.

Third, manipulation may be carried out to produce definite reductions, when definite displacements are suspected.

Fourth, the position obtained is held by apparatus, usually plaster, before the patient recovers the use of his muscles. Whatever may happen, Fiske has not yet failed to see complete relief from the sciatica follow immediately upon the manipulation of the back, and in most cases relief has continued.

Surgical Operation for Lumbago and Sciatic Rheumatism. N. A. Johanson[6] has operated upon six patients who had either congenital anomalies of the lumbosacral region or else osteo-arthritis. Abnormalities of the fifth lumbar vertebra are common, and often cause pain. The operation was the bone-graft of Albee, intended to produce ankylosis from the third lumbar vertebra to the first sacral. Five of the cases resulted successfully, one patient became infected and failed to obtain relief.

[Some years ago, E. H. Arnold, of New Haven, reported a series of operations for similar indications, with excellent results, in the *Journal of Orthopedic Surgery*. Spondylolisthesis, which occurs more often than is generally supposed, can readily be cured by this method.—Ed.]

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(6) Northwest Med., 1920, vol. 19, p. 195.

THE UPPER EXTREMITY

Recurrent Dislocation of the Shoulder-Joint. Practically all shoulder-joint dislocations, says A. Gibson,[7] occur downward through the weak inferior portion of the capsule where there are no supporting muscular structures. The ordinary operations of overlapping or reefing the anterior part of the capsule do not attack the problem at the proper point, although they sometimes result in apparent success. E. A. Rich's proposal to limit abduction by silk cords from scapula to humerus will cause undesirable restriction of motion. No mention is made of T. Turner Thomas's method of overlapping the lower portion of the capsule through a posterior axillary incision, although Thomas reports many successful cases.

Gibson strongly advocates the Clairmont-Erlich operation, recently described in the *Journal of Orthopedic Surgery* (May 1920). The technique is not widely known, and is here repeated in Gibson's clear language. The mechanism of the dislocation is well interpreted, but will be omitted in this review. The object of the Clairmont operation is to provide a sling-support for the lower aspect of the joint by transplanting a long and thick piece of the posterior deltoid muscle under the joint and fastening it in front to the coracoid process.

Operation:—Patient lying on sound side, arm draped separately, as it must be moved during operation. Incision from coracoid process along anterior border of deltoid to a point below deltoid insertion. Cephalic vein identified and retracted outward. Delto-pectoral groove is opened up and pectoralis major is detached from its insertion. This brings into view the two heads of the biceps muscle, and dissection is carried out between these. The tendon of the latissimus dorsi soon comes into view, lying upon the muscular fibers of the teres major. The upper border of the latissimus corresponds with the lower boundary of the quadrilateral space, so the axillary nerve is in no danger, the tendon of the latissimus is severed and also the teres major to make sure that the quadrilateral space is fully opened up from the front. The finger

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(7) Canadian Med. Ass'n. Jour., March, 1921.

is then passed into this space, dilating it. A long incision is then made over the posterior border of the deltoid, from the spine of the scapula to below the deltoid insertion. The skin and superficial fascia are dissected from off the posterior part of the deltoid muscle, and the insertion is laid bare to its lowest limits. Commencing below, and making sure to include some of the fibrous insertion of the muscle into the humerus, a strip about three-fourths of an inch wide is dissected from the posterior portion of the muscle. As this is traced carefully upward, the nerve supply coming from the axillary will be found entering it, accompanied by blood-vessels. This nerve-supply must be carefully preserved, or the operation will have failed in its main object. It is not necessary to dissect the deltoid strip as high as the scapular spine. The finger is then passed from the anterior wound through the enlarged quadrilateral space, emerging posteriorly. A long pair of forceps is then passed through this opening, and the extremity of the deltoid flap is grasped and pulled through the quadrilateral space from behind forwards. Provided the space has been sufficiently enlarged, this maneuver presents no difficulty. If a sufficient length of deltoid has been detached, the tip of the flap reaches easily to the coracoid process, where it is firmly anchored to the periosteum with silk. [or kangaroo tendon, or chromicized catgut.—Ed]. The sides of the flap near the tip can be attached to neighboring structures for greater security.

It only remains to reunite the severed pectoralis major to its insertion. The latissimus dorsi and teres major may be left to take care of themselves. Union occurs through the medium of a small amount of scar tissue. No drainage is necessary. The arm is bound to the side for ten days, after which the sutures are removed. Thereafter for another ten days a sling is employed. At the expiration of three weeks the sling is withdrawn and perfect freedom permitted. Full movement is usually attained in three weeks or so.

R. Jones reports two cases operated on by this method, the first a failure, the second a success. He believes the failure was due to, first, too short a deltoid flap; second, insufficient enlargement of the quadrilateral space; and, third, insufficient fixation of the flap to prevent it from returning to its original place.

Gibson has operated in seven cases, none of which has as yet relapsed. The earliest was done over two years before the date of the report.

Ollerenshaw's article, published in the *Journal of Orthopedic Association* (May, 1920), reports four cases.

[The description given by Ollerenshaw of this operation differs from that by Gibson in a very important point, namely, the place of attachment of the free end of the deltoid flap. According to Clairmont, the flap is to be sutured to the edges of the split deltoid in front, in the upper angle of the wound. Ollerenshaw objects to this, and prefers to sew the flap to the anterior surface of the subscapularis tendon. Gibson sews it to the coracoid process of the scapula, which in the opinion of the Editor, is by far the most logical method. It provides an attachment to a bony prominence on the scapula instead of on the humerus. To one who, like the Editor, has never as yet performed the operation, the methods of Clairmont and Ollerenshaw would appear somewhat like attempting to hoist one's self by pulling on one's own boot-straps, because the flap is sutured to tendons or muscles which are attached to the same humerus which we are attempting to sling up and support. If, however, the attachment be made to the scapula, a very definite support will be afforded, on good mechanical principles.—Ed.]

Operative Treatment of Shoulder Dislocations. The variety of views held on the subject of operative treatment of shoulder dislocations is well brought out in contemporaneous articles by T. T. Thomas,[8] J. W. Sever,[9] M. S. Henderson,[1] and E. J. R. Evatt.[2]

Thomas and Henderson advocate pleating the capsule, the former by an incision in the posterior axillary line below the vessels, the latter along the anterior axillary border. Sever contends that the only essential operation is the division, without subsequent repair, of the pectoralis major, and the shortening of the subscapularis tendon. Evatt drills a hole in the edge of the scapula and in the

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(8) Surg. Gynec. and Obstet., April, 1921.
(9) Jour. Amer. Med. Ass'n., April 2, 1921.
(1) Surg. Gynec. and Obstet., July, 1921.
(2) Dublin Jour. Med. Sci., April, 1921.

humerus at the level of the teres major, and ties these bones loosely together with a very stout cord of silk, so as to limit the range of abduction of the humerus to an angle of 75 degrees with the scapula. [From an impartial standpoint, the Clairmont operation as performed by Gibson would seem to be the most rational of all the methods, although Sever's suggestion is the most simple.

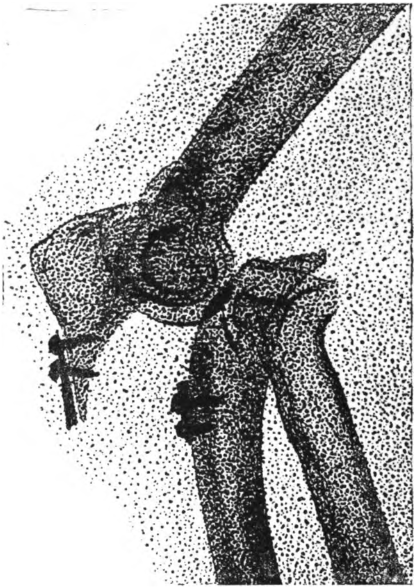

Fig. 5.

One would think, however, that the deliberate sacrifice of the pectoralis would weaken the arm to an undesirable extent, but Sever states than in forty cases no "essential" loss of function has been observed.—Ed.]

Elbow Fractures. The fractures in this report by C. Lenormant and Lebrun[3] were complicated by luxations. The first was an epitrochlear fracture with luxation of both bones of the forearm backward and outward and interposition of the fragments in the articular interline.

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(3) Presse méd., Jan. 15, 1921.

In general such a fracture must be treated by arthrotomy. The fragment being voluminous after reduction was restored to its position and fixed with a screw. Anatomic and functional restoration was perfect.

The second case was an oblique fracture of the base of the forearm. Owing to the difficulty of maintaining the reduced luxation, although the patient was 70 years old, the authors made an osteosynthesis, combining wire "cerclage" with a Lambotte's plate. The result, while less brilliant than in the first case, was quite satisfactory. The radiograph (Fig. 5) shows the condition eight days after the first operation, the fragments having slipped out of place. Figure 6 shows the final result after the third operation.

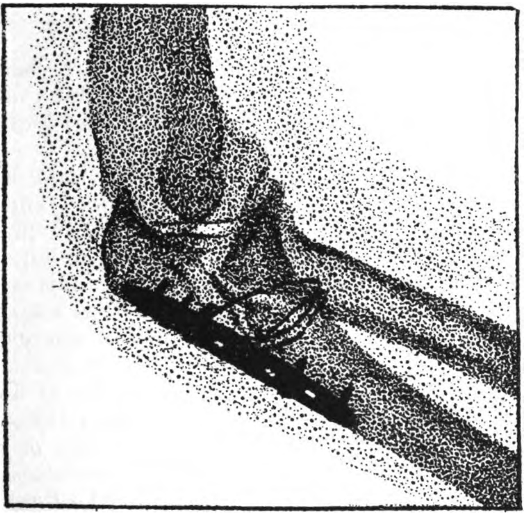

Fig. 6.

Delayed Union and Non-Union of the Radius and Ulna. With the full coöperation of the patient and sufficient time at his disposal the surgeon may solve most of the problems complicating impaired union. While the failure of most fractures to unite is due to faulty reduction, incomplete fixation, interposition of peri-osseous structures, necrosis, loss of bone substance, and impaired blood and nerve supply, there is a group in which neither syphilis nor any of the foregoing factors appear, but in which the process of ossification ceases before union is complete.

In fifty-nine cases of delayed union or non-union observed by H. W. Meyerding[4] in the Mayo Clinic, imperfect reduction, inadequate fixation, and too early use appeared to be the principal causes, all cases being of the forearm.

Roentgen-ray examination of all fractures before reduction and after reduction and at regular intervals until the patient is dismissed should be made and kept in the form of a permanent record plate or print.

If the average fixation time has expired and examination still shows motion, continue fixation. The writer has chosen six months as the time after which an ununited ulna and radius may be called non-union. Under this time he calls it delayed union. He advises general surgical and medical examination as well as a laboratory report and the necessary treatment for whatever condition found. If infection, a contraindication to the main operation, exists, a preliminary one is done, removing sequestra, Lane plates, excising scar tissue, allowing wound to granulate from the bottom up, or doing a secondary suture. In bone abscesses he curettes, dishes, and packs or Dakinizes. Operation for the final correction is deferred until all evidence of dormant infection has disappeared.

Operation: Experience has led the author to prefer the massive bone graft held by beef-bone screws and external fixation with plaster-of-Paris. There should be no strain on the transplant. The massive graft containing a preponderance of osteoblasts is easily obtained in any shape and size from the flat internal surface of the tibia. Splinting should be continued until the *x*-ray shows that strong osseous tissue has formed. Light massage and careful exercise aids the circulation and in loosening stiffened parts.

With excellent diagrams and well chosen *x*-rays he presents the following conclusions:

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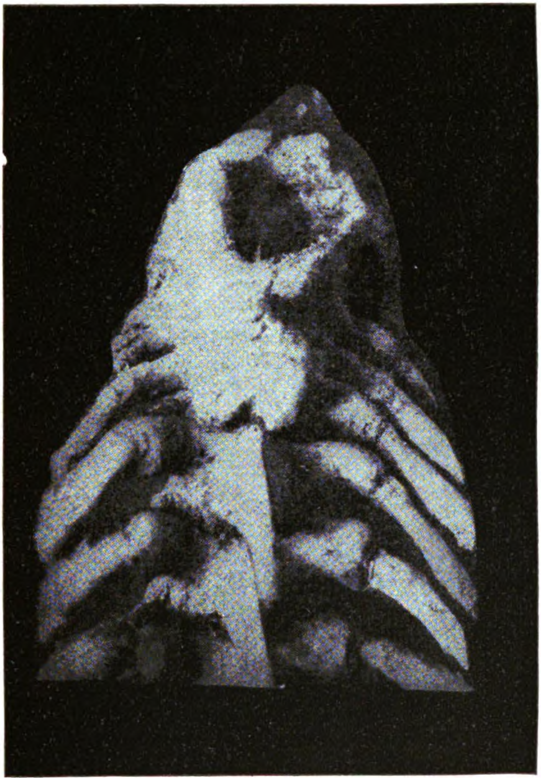
(4) Minnesota Med., April, 1921.

PLATE VI.



Case of Mm. Klippel and A. Feil. Upper end of vertebral column. Note spina bifida.—Dubreuil-Chambardel, page 210.

He advocates the massive bone graft held firmly by beef-bone screws.

The flat surface of the tibia supplies a graft of almost any size and shape and with medullary bone rich in osteoblasts allows a wide approximation which insures early union.

Fixation by a plaster-of-Paris cast from the fingers to the mid-humerus is a satisfactory method.

Fixation should be maintained until firm union and a strong bridge of bone are demonstrated.

The arm should be used gradually on removal of fixation as the graft fractures when it is subjected to too great or sudden stress.

Fractured grafts may reunite when given further fixation.

Décalage in Fractures of the Radius. If patients with consolidated fracture of the lower end of the radius be examined, a number of them, says P. Mocquot,[5] will be found to show more or less limitation of the movement of supination. This is due to lesions of the radio-cubital

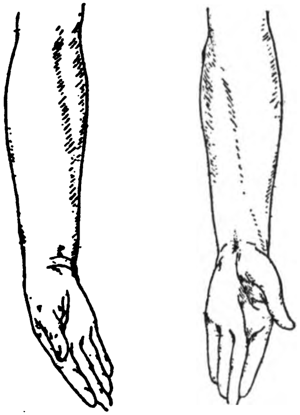


Fig. 7.—Fracture of lower end of right radius. The arms are symmetrically placed. The left hand is in supination; the right is in incomplete supination.

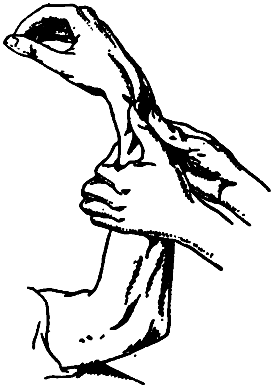


Fig. 8.—Position of hands in producing and maintaining reduction. The fingers press on the upper fragment and the thumbs on the lower fragment.

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(5) Presse méd., July 20, 1921.

articulation. There may also be limitation of pronation. This condition, a tendency of the inferior fractured fragments to turn inward and forward is what the author means by "*décalage.*" Some authors have considered the condition as secondary to the surgical maneuvers of reduction, but Mocquot's investigations of a large number of cases shows that it is very frequently primary, and a consequence of the traumatism. The surgeon does not cause it, but he should correct it. Volkmann's maneuver of reduction Mocquot thinks dangerous. Destot recommended Pilcher's maneuver in two stages. Mocquot prefers to free the fragments by extension and flexion movements. Then, with the patient lying down, the arm being flat upon the table and the forearm vertical, the fingers of each hand act on the superior fragment and the thumbs upon the inferior fragment so as to restore its anterior concavity to the bone; the two hands working together to place the wrist and hand in supination, destroying the "*décalage.*" When the desired effect has been obtained a plaster apparatus is applied, the limb being then in supination, slight flexion and cubital inclination. The condition is shown in Figures 7, 8, and 9.

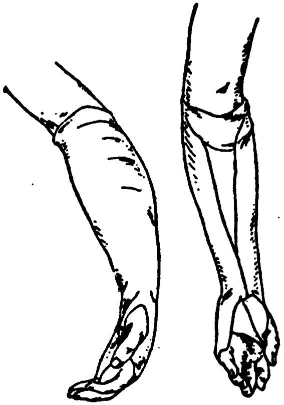

Fig. 9.—Position of the limb in the dressing. Supination, slight flexion and slight cubital inclination.

Dislocation of the Carpal Semilunar Bone. Isidore Cohn[6] has written an excellent paper on this subject, reporting the case of a patient who was subjected to operation. The incision used was that of James Thompson, beginning at the radial styloid, and extending upward for two inches. The tendon of the supinator longus (brachio-radialis) was retracted to the radial side. The radial artery and nerve and the superficial flexors were

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(6) Ann. Surg., April, 1921.

retracted to the ulnar side. The pronator quadratus was exposed. and the anterior radio-carpal ligament was incised. exposing the first row of carpal bones. The dislocated semilunar bone came readily into view and was removed after cutting the interosseous ligament.

W. G. Stern has reported the manual replacement of a dislocated semilunar soon after the accident.

[The Editor has removed the dislocated semilunar in two cases, both of long standing. One patient was a soldier at Fort Sheridan, who failed to improve under conservative treatment, the other was a young man seen in the spring of 1921. Both patients have been well satisfied with the result. Thompson's incision is better than the one used in these two cases (between the palmaris longus and the flexor carpi radialis) because it causes less trauma to the tendon sheaths.]

Chondroma of Finger. Delbet's[7] article is a clinical lecture concerning a chondroma on the index finger of a man aged 55.

Such true chondromata (the endochondroma of Cruveilhier) which develop from cartilage islets in the thickness of the bone must be distinguished from the exostoses of growth (cartilaginous or osteogenetic exostoses) which develop at the expense of the epiphyseal cartilage. Certain considerations may lead to the thought that the osteogenetic exostoses and the chondromata which are met with in children have some common element. But there is a considerable difference. Cartilaginous or osteogenetic exostoses always evolve toward ossification; in the adult they are ossified and in certain cases even medullarized, *i. e.*, become correct and legitimate bone. But it is not so with the chondroma; there is no such tendency toward bone production. There may be some calcification, but the presence of such granules does not suffice to make bone. In some cases there is production of spongioid tissue, but there is no regular or legitimate bone. Chondromata which undergo this change ought not be termed ossified chondromata, but osteoid chondromata. These osteoid tumors tending to

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(7) Progrès méd., 1921, p. 463.

produce abnormal irregular bone are of extreme malignancy. The tumor in Delbet's case was of this type.

THE LOWER EXTREMITY

Diagnosis and Treatment of Hip Disease. Those alterations of the hip which are so often met with in tuberculous coxitis and which are known as cotylean migrations or improperly as pathologic luxations should be clearly distinguished, says D. Maragliano,[8] from the true luxations due to coxitis. In the first a displacement of the head of the femur is gradually established owing to erosions of the superior and posterior cotylean margins; but the superior extremity of the femur preserves a solid bony support against the pelvis in the articular cavity which is more or less deformed. In true luxations the head of the femur is dissociated from the acetabulum without the latter showing notable deformation, owing to primary ligamental and capsular lesions.

The treatments generally proposed are either the application of one of the innumerable apparatus devised for fixation of the hip-joint or else a decapitation of the superior extremity of the femur. As regards apparatus, Maragliano agrees with Galeazzi that "they have practically no efficacy in arresting the femoral head in the iliac fossa, and the longer they are carried the more difficult it is to emancipate the patient from them." Femoral decapitation may give good results in some cases but there are two inconveniences: *viz.* aggravation of disturbances of growth and progressive adduction, which are especially difficult to avoid in poor patients who can not be submitted to prolonged postoperative supervision.

The author has for a long time sought some therapeutic solution of the problem of coxitic luxation of the hip. His earlier attempts, although giving good clinical results, did not satisfy him. The fundamental idea of the intervention was to create conditions favorable to recovery from the coxitis by ankylosing the hip and by eliminating the functional weight from the articular heads. This was realized by a periostic graft cut from

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(8) Chir. d. org. di movimente, 1921, vol. 5, p. 225.

the tibia and inserted in a trench excavated in the wing of the ilium and continued in the upper part of the femur. A clinical cure was realized but there were some inconveniences: *viz.*, slight infection owing probably to dealing with the diseased part of the femur; some progressive adduction noticeable after a few years; and rather severe hemorrhage. In spite therefore of the favorable clinical result obtained, a rapid, complete and durable recovery from the coxitis, the author determined to seek some other mode of operation. He thought that a solid point of support might be given to the femur against the ischiatic tuberosity by a stout autoplastic osteoperiostic graft. The weight of the body would then act through the ischio-sacral arc and the new point of support would be notably within the pathologic one already established, and, correction of the severe lateral displacement would thus be obtained.

This was carried out clinically in a patient aged 9 years, who had suffered from tuberculous coxitis since 3 years old. Operation was done June, 1919, and sufficient time has elapsed to judge of the value of the operation. The internal extremity of the graft was fixed by silver wire to the ischiatic tuberosity, while the external extremity which protruded about 1 cm. beyond the diaphysis remained in its position solely by attrition against the diaphysary canal. The inserted bone graft was somewhat analogous to a long femoral neck which receiving the weight of the trunk from the inferior extremity of the ischio-sacral arc transmitted it to the femur. There is no doubt but that the graft was able to carry its assumed load. The notable and progressive strengthening and walking of the child without any supporting apparatus proves this.

This case is also interesting because it is one of the rare examples in which a bone graft has for its object not the substitution of a section of the skeleton, but rather to constitute a new element.

Operative Treatment of Old Hip Disease. M. H. Rogers and C. W. Peabody[9] believe that the older patients in whom tuberculosis of the hip-joint has existed for many years with periods of remission and recurrence will

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(9) Jour. Orthop. Surg., November, 1920.

be found to have slight or definite motion in the hip-joint. These individuals can be rapidly cured of their dangerous disability by an operation which will produce bony ankylosis of the joint.

The Smith-Peterson incision is used and the acetabulum is thoroughly cleaned out. Enough of the head of the femur is removed to eradicate the diseased surface and to allow correction of the adduction and flexion deformity. Care must be taken that fresh bony surfaces are in direct contact. All evident necrotic material found at operation is cleaned out, but it is impossible to remove all of the tuberculous material and in practice it is found to be necessary.

Old cases of hip disease with bony ankylosis and deformity form another group. In these cases the standard treatment is some form of osteotomy near the trochanter and outside of the joint. A third group consists of those cases in which the head has been destroyed and the trochanter rides up on the ilium. A careful study of such cases leads to the belief that the motion in the false joint is the cause of the continuance of symptoms. The principle of treatment in this group is to place the top of the trochanter into the acetabulum by open operation after the bones have been freshened. Plaster-of-Paris is applied for a sufficient length of time to produce bony ankylosis.

Congenital Dislocation of the Hip. Adolf Lorenz[10] states that the so-called congenital dislocation of the hip is not, as a rule, congenital, but is an acquired static deformity, due to a congenital predisposition, the result of delay in the development of the bone and an abnormally shallow acetabulum. It may be regarded as due to disturbances in the innervation of the skeleton and lower extremity.

Replacement of the hip with fixation in maximum horizontal abduction for from six to nine months is the best treatment; usually no change of the plaster-of-Paris cast is necessary. In unilateral dislocation, operation should be performed, he says, by the end of the sixth year, and in bilateral cases by the end of the fifth year.

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(10) Die sogennante angeborene Hueftverrenkung, ihre Pathol. u. Therap., Stuttgart, 1920.

Open Operation for Congenital Dislocation of the Hip. H. P. H. Galloway[1] agrees with H. M. Sherman that very few cases can be successfully treated by the bloodless method. Sherman was "disgusted with the downright failures and fictitious successes" and the dangers of the manipulative method. Of twenty-eight hips upon which he performed arthrotomy only one had a sufficiently large capsule for the passage of the head; he says that no possible force could have put the femoral head through the narrow part of the capsule in the other twenty-seven cases. He cites the various well-known accidents which may occur in the manipulative method.

On hearing Sherman's paper, Galloway began to try the open operation, and finally abandoned the bloodless method entirely. In 95 per cent. of his cases it was clearly an impossibility to pass the head through the capsule. Only after the constriction was freely relieved by the knife could the head really be placed in the acetabulum. He lays down the following principles:

1. All cases should be treated by open operation, never by manipulation alone, except possibly in children under 2½ years of age, who may be treated by Frauenthal's manipulation without anesthetic and without post-operative fixation. The latter method he considers still *sub judice*.
2. Open operation should not be reserved for those cases only in which manipulative methods have failed.
3. The best age for the open operation is between 2 and 3 years.
4. For most children under 6 years of age, the anterior incision is the best approach to the joint. In older patients the posterior incision offers certain advantages. In difficult cases the ilio-psoas tendon should be divided.
5. In single dislocations there is practically no age limit to treatment by open operation. In adults with double dislocation, if there is much disability, at least one hip should be stabilized; neither hip should be operated on if the disability is small.
6. In double dislocations in children only one hip should be operated on at first. After six or eight weeks

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(1) Jour. Orthop. Surg., July, 1920.

the other may be operated on; or even a much longer time may be allowed to elapse.

Operation: an incision 4 inches long is made downward from just below the anterior superior spine, and is extended upward and backward just below the crest of the ilium for 2 inches. The interval between rectus and tensor fascial femoris is found, and the origin of the tensor is stripped from the ilium. [Practically a Sprengel or Smith-Peterson incision.—Ed.] The head is found, and the capsule opened. A herniotomy knife is passed along the finger in the capsule, and the constricted portion is freely incised. The head is now manipulated into the socket, with the aid of a shoehorn-like instrument, [Murphy's bone-skid is excellent.—Ed.], and the position of greatest stability is determined by redislocating one or more times. The wound is closed without suturing the capsule, and a plaster-of-Paris dressing applied, usually with the thigh in full extension, and with 25 degrees flexion of the knee, from 40 to 60 degrees of abduction, and slight or pronounced internal rotation. After six weeks, a second plaster is applied with diminished abduction and internal rotation, and the child is encouraged to bear weight on the limb. A third and even a fourth dressing may be applied at intervals of a couple of months. In older patients, a Kocher incision is used, the muscles attached to the trochanter are cut, and the abductor muscles are tenotomized. If the head can not be reduced by the use of the "shoehorn" (a heavy carpenter's gouge with the cutting edge blunted and the corners rounded) and by powerful efforts, Galloway removes the head and neck of the femur and about an inch of the upper extremity of the femur distal to the neck. This was done in two cases, in one with excellent result, the other is too recent to record. Exceptionally the acetabulum must be deepened. In a few cases a deliberate ankylosis is made after removal of head and neck. The thigh is slightly abducted in these cases.

Case Reports: Fifty hips in thirty-seven patients. Seven hips excluded as only excision of head was done. Five others excluded for other reasons.

Thirty-eight operations in thirty-one patients are analyzed: Cured, twelve; good results, fourteen; failures, six; doubtful, six. This is about 32 per cent. cured and 37 per cent. good results, 16 per cent. definite failures. In several cases classed as "good results" there is complete ankylosis, and in several more there is marked limitation of movement. In one case in this class, the head is not in the acetabulum on either side, but abnormal lordosis has disappeared and stability is all that could be desired.

Wound infection occurred six times in the fifty cases —one patient died, one hip was worse than before operation and two other hips became ankylosed by reason of infection.

[As might have been expected, there was considerable discussion over this paper. W. G. Stern made an excellent point when he stated that Drs. Sherman and Galloway were not justified in believing that the head of the femur could not go through the constriction in the capsule. He aptly remarks that one who knew nothing of obstetrics might say, on finding the cervix uteri undilated, that the fetal head could not get through because the cervix was narrow and the head was large. Practical experience has shown that the bloodless reduction is by far the most successful in not only the few cases from one locality, but in the large majority of all cases the world over.

A. H. Freiberg said that the question was not whether Dr. Galloway gets the head in the acetabulum, but whether or not he gets good results.

J. L. Porter does not believe that every dislocation of the hip can be reduced by bloodless operation, or that every one needs open operation. He advised the appointment of a committee to investigate the results.

G. B. Packard said that in his own practice there were 85 per cent. of very satisfactory results in the unilateral dislocations. The bilateral series was almost as encouraging.

In considering the statements made by Sherman and Galloway, it must first be mentioned by the Editor that both of these men were (Sherman is no longer living) absolutely truthful and honest, and that what they have said was not dictated by any spirit of unkindly or carping criticism. They were able and conscientious surgeons and, indeed, unusually skillful. Their views, therefore, are entitled to the most careful consideration. If they make the deliberate statement (and they have done so) that, in 95 per cent. of seventy-eight hips operated upon by them, the head could not have been forced through the constriction in the capsule, we have to conclude that they were either right or wrong. If they were right, then what has happened in the very many cases of complete cure by the bloodless method? We have all seen such cases: most of us have had perfect results in at least enough cases to prove the possibility; a year ago a dozen cases were shown at the Children's Memorial Hospital which had such perfect form and function that the operators themselves could not tell which hip had been dislocated. It is true that in a great many instances late changes may take place in the replaced heads.

Z. B. Adams has done a splendid bit of work in bringing this fact before us, and in a year or two more we shall be in much better position to know the definite proportion in which changes in contour may be expected to develop. It may even be that all cases will be shown to have actual deformity, or at least asymmetry, of the head originally dislocated, but what of that? Will there be any less distortion or dysplasia of the head after the open operation than after the manipulative? It is hardly credible. What we do know is this: a great many individuals are now walking around in the world who have practically perfect restoration of form and function in hips that had been found to be dislocated at or before the time when the child began to walk. (The awkward arrangement of the preceding sentence is occasioned by the reasonable doubt as to whether these dislocations are pre-natal, congenital, or post-natal.) The enormous majority of these cured patients with hip dislocation were operated upon by the manipulative method.

With the improvements in technique perfected especially by Ridlon, the dangers of fracture, rupture, paralysis, etc. have been reduced to a negligible figure in children below the age of 7 or 8 years. The analysis of Galloway's results can not be said to compare favorably with the results in the practice of surgeons who are as skillful in the manipulative method as Galloway is in the open method.

It is evident, then, that either (1) Sherman and Galloway are mistaken in thinking that so high a percentage of heads cannot be forced through the capsule at the time of operation, or (2) it is *not necessary* to force the head through the capsule at the time of operation.

It is easy to believe that the head can be placed against the acetabulum with comparative ease, in suitable cases. If it does not go up through the capsule, along the normal route, then the capsule must be either folded between head and socket, or must be pursed up like a rolled-up glove finger with the head pushing against it as the fetal head pushes against the cervix. It is easy for the Editor to believe that this latter occurrence is what frequently takes place in those cases in which the capsule is really contracted. It would certainly be aided by weight-bearing, and it is a matter of general belief that weight-bearing is advisable soon after manipulative reduction. If the capsule be folded between head and socket, with two or three thicknesses of capsule intervening between these bones, it is still possible to believe that by the pull of the muscles and the use of weight-bearing, sufficient atrophy of the capsule may be caused to wear away the capsular layers and allow the cartilaginous surfaces to come together. So few patients have died after the bloodless operation that accurate anatomic studies of this particular point are very rare.

The Editor feels very strongly convinced that the open operations should be reserved for those cases which can not be reduced by a reasonable and skillful trial of the manipulative method. He considers that Sherman and Galloway have not given sufficient weight to the undoubted fact that many patients have been cured by the bloodless methods, and with all the respect due to their sincerity and their skill, he thinks it undesirable to foster the idea that every congenital hip dislocation must be operated upon by the open method.—Ed.]

Treatment of Long-Standing Dislocations of the Hip. Shoemaker,[2] of The Hague, Holland, reports the case of a girl, 23 years old, in whom the femur, including the trochanter, the head and neck, and the soft parts of the thigh were well-developed. A line drawn through the top of the trochanter passing through the anterior spine passes through the mid-line at the symphysis where, as on the opposite side, it passes through the umbilicus. This line the author calls the "trochanter-spinal line" and believes it valuable in indicating displacements of the trochanter.

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(2) Surg. Gynec. and Obstet., May, 1921.

After verifying a dorsal dislocation with the Roentgen ray he attempted a reduction using the following technique: First he planned to reduce the dislocation with powerful extension; next to open the joint, incise the capsule, clean out the acetabulum and then replace the head; and lastly he expected to shorten the femur if he failed in using either of the above methods.

A 6 kilogram weight was applied and left for fourteen days; then under an anesthetic a Lorenz traction apparatus was used. After pulling the trochanter well down Shoemaker loosened the traction apparatus and used the modified Lorenz method of reducing a congenital dislocation of the hip. With the leg strongly abducted and the knee against the table a cast was applied although he did not feel the jump of a dislocation. He was convinced the reduction had not been made but concluded the head lay just "over" the acetabulum, from its relative position and from the fact that the patient complained of pain at the inside of the knee, on recovering from the anesthetic. This spot was exactly the same as that pointed out in early inflammations of the hip.

Six weeks later an *x*-ray showed the head to be entirely inside the acetabulum. The patient was again placed in a cast with the leg not so strongly abducted as before. After another six weeks the second cast was removed and the patient walked without a limp.

A second case is reported in which the author used the same method successfully. He advocates using this method in all long-standing cases and emphasizes that all manipulation should be done with moderate force. If reduction is not successful at first it may be accomplished in two stages. The author tries to convert all obdurator or sciatic positions into dorsal dislocations.

Fractured Hip in Patient 106 Years Old. This very unusual case is reported by R. T. Pirtle.[3] The patient, a woman over 106 years of age, fell and sustained an intracapsular fracture of the neck of the right femur. There was shortening of 1½ inches. Under nitrous-oxide anesthesia, with oxygen, the leg was placed in Whitman's position of abduction (and inversion?) and a long plaster-of-Paris spica applied. Only one dose of morphine was necessary, and that was given before the fracture was reduced. She had no pain after the plaster was applied. This report was made nineteen days after reduction, and a further report is promised.

The main reason for reporting this case is, first, to show that old age is no contraindication to the use of a plaster dressing for fracture of the hip if the spica is well applied and the patient is carefully nursed, and, second, that one need not be afraid to give nitrous-oxide-gas and oxygen anesthesia in the aged. This patient has a mitral regurgitation and an abdominal tumor. Her grandfather lived to be 107 years old and her father 102.

Researches on Congenital Luxation of the Hip. F. Calot's[4] cadaveric researches have assured him that the true or original acetabulum of congenital hip luxation corresponds to the ischium and not to the ilium of the hip-bone in children. Up to the present both surgeons and radiologists, he says, have erroneously considered this acetabulum as corresponding to the ilium.

Up to now the majority of surgeons have had but one formula for the treatment of all types of hip luxation, but Calot is satisfied that there are laws, based on the value of the angles of inclination and torsion of the neck of the femur, which govern the exact method of reduction in each particular case, in order to give the thigh perfect orientation of the femoral head. This orientation means that the axis of the neck and head must be kept horizontal and transversal during the whole treatment, facing the ischium and not the ilium. The rotation to be given the thigh is dictated by the angles of torsion of the superior extremity of the femur and it must be equal to this angle. Abduction is regulated by the

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(3) Kentucky Med. Jour., March, 1921.
(4) Presse méd., Sept. 22, 1920.

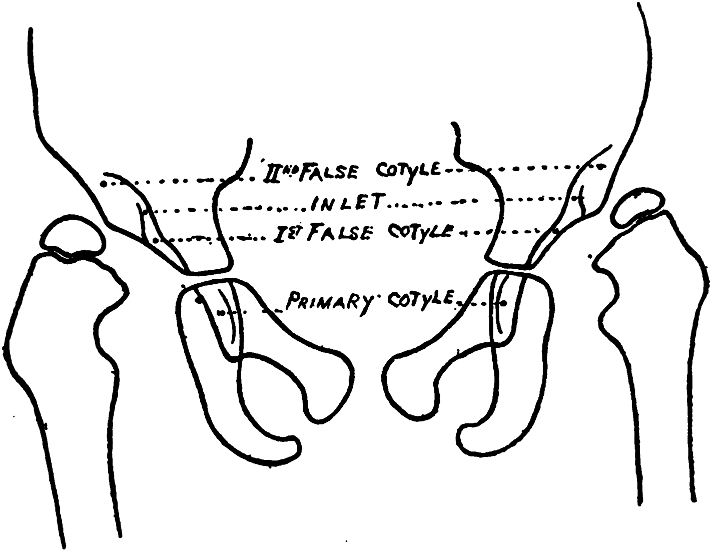

Fig. 10.—A radiograph of congenital luxation. "Cotyle" means acetabulum.

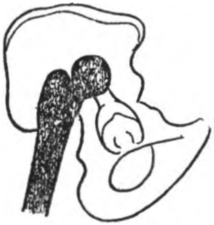

Fig. 11.—A case of congenital luxation.

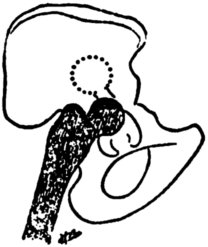

Fig. 12.—The same. False reduction.

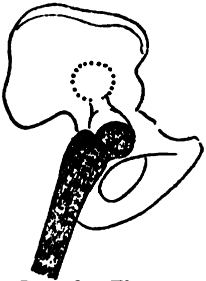

Fig. 13.—The same. True reduction.

amount of "hang" of the neck. The general practical rule is that abduction ought be equal to the angle of inclination of the neck less 80 degrees. The best position of flexion is 90 degrees (Figs. 10 to 15).

Operative Treatment of Congenital Luxation. K. Gaugele[5] deals with the importance of the adductors of the thighs and their functions. It is very important to spare these muscles in any operations practiced for the reduction of congenital luxation of the hip.

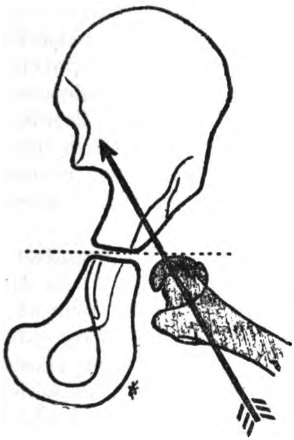

Fig. 14.—Bad orientation.

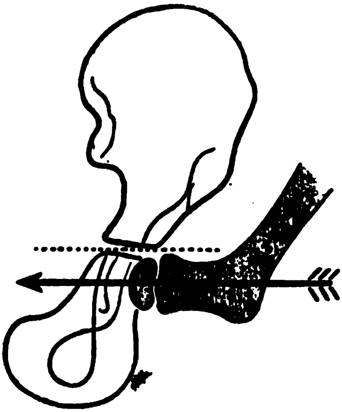

Fig. 15.—Good orientation.

Children in whom the thigh adductors have been operatively ruptured, have shown, despite a perfect anatomic reduction, a defective walk and attitude. The internal edges of the thighs do not touch but show hollows in place of the salient projections formed by the adductors. The thigh is in abduction, in external rotation and in slight flexion. Walking is faulty and fatigue comes on rapidly, especially when mounting stairs. The articulation is in a state of laxity. Bruns in France and Drehmann in Germany were the only ones to note these facts.

Gaugele thinks that even in older children it is possible to reduce the hip without rupturing the adductors; but

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(5) Zeitschr. f. Orthop. Chir., 1920, vol. 40, p. 289.

he appeals to practitioners to operate as early as possible, as in the early years the reduction can always be affected without rupturing the adductors.

Contusions of the Hip. The study of numerous radiographs taken in many cases in which a diagnosis of contusion of the hip had been made has shown Basset[6] that it was really a matter of a complete or incomplete fracture. In text-books, even to the present day, a distinction is always made between contusion and fracture based, owing to the similarity of symptoms, on the fact that in contusions the patient can actively correct the vicious position and at least to a certain degree raise the limb so that in cases of contusion functional impotence is relative. But such findings should not rule the diagnosis because all surgeons have observed cases of fracture of the neck of the femur in which the patient can make some steps, but in which when the fragments then become disengaged there is later on absolute functional impotence.

The consequences of a failure correctly to diagnose a fracture are very grave, and Basset insists upon the necessity for a precise diagnosis. The clinical form of a simple contusion which does not cause any appreciable functional disturbance, and is without any bone lesion, does not enter into the discussion. The condition which the author discusses is the form generally admitted which causes functional disturbances which do not arise from a skeletal lesion, and his findings are based on his own private observations and a long experience in Delbet's clinic.

As a matter of fact, all the cases diagnosed as contusions were, on radiographic control, found to be fractures (more or less complete) of the neck of the femur. Age is not an element which excludes fractures, since in the 128 cases studied about half were under 60 years.

In practice, therefore, when radiographic apparatus is not employed it is always well to suspect fracture in every severe contusion of the hip.

Legg's or Perthes's Disease. According to H. B. Roderick,[7] whether or not some constitutional condition underlies Legg's disease has not yet been proved. How-

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(6) Presse méd., 1920.
(7) Lancet, Jan. 29, 1921.

ever, the disease must be one of three pathologic processes namely, new growth, inflammation, or degeneration due to some circulatory disturbance.

There is nothing to suggest new growth. Ely states that it is not likely that a destructive inflammation could exist in the head of the femur without causing symptoms of arthritis. There is no evidence of arthritis. Trauma must be considered because a large proportion of the cases give a history of previous injury.

As to treatment, the author advises fixing the thigh in an abducted position by means of a plaster-of-Paris splint and allowing the child up on crutches with a patten (a high-soled shoe) under the sound foot until the more acute stage has passed.

Pseudo-Coxalgia: Legg-Perthes Disease. Fairbank[8] says that the chief importance in recognizing this condition lies in the difference between its prognosis and that of tuberculous hip disease, for which it is not uncommonly mistaken. Juvenile osteochrondritis is by no means rare and affects children from 3½ to 12 years of age, and males more than females; it is usually unilateral but may be bilateral. This disease begins with a limp which persists and is accompanied by little or no pain. On examination the position of the limb at rest is usually normal. The thigh and buttock are slightly atrophied, with resulting apparent prominence of the trochanter; some thickening of the neck of the femur may be felt; abduction of the hip is markedly limited or obliterated, while flexion remains free, almost, if not quite to the normal limit. Internal rotation and extension may be limited; at this stage there is no shortening, and rarely does the shortening amount to much. Trendelenburg's sign is usually positive. There is no pain or jarring.

The diagnosis can be accurately determined by the *x*-ray plate. The progress is always toward recovery. Abscess formation and other complications seen in true hip diseases never occur.

For the treatment, a walking calliper splint to take the weight off the femur is no doubt the best. However, patients with severe muscle spasm may require a plaster cast for a while.

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(8) Lancet, Jan. 1, 1921.

Nothing definite is known as to the nature of the affection. The theory which receives the greatest support is that trauma produces damage to the blood-supply of the head of the femur, and that the changes in the ossification of the bone are secondary to this damage.

Epiphysitis of the Head of the Femur—Operation-Findings and Result. D. B. Phemister[9] operated on a case in which the *x*-ray findings were typical of Legg-Perthes disease. The joint was exposed and aspirated. Aspiration yielded 5 c.c. of a slightly turbid straw-colored fluid. The joint was then opened and more fluid escaped. There was a mild synovitis with a few small villous tags attached to the synovial lining. The articular surface of the head was smooth and shining, but the contour was greatly changed, there being a marked flattening of the surface opposing the iliac portion of the acetabular margin. The center of ossification and a portion of the epiphyseal line were exposed. The center of ossification in the epiphysis was almost entirely broken down in its lateral portion, forming a cavity which was partly filled by granulation tissue and partly by necrotic debris which included several various-sized sequestra. The cavity was thoroughly curetted, after which the joint was closed and a plaster-of-Paris spica applied. Cultures made showed no growth.

Histologic Examination: A synovial tag consisted of hyperplastic connective tissue elements with a few areas of round-cell infiltration and a thickened synovial covering rich in nuclei. The excised portion of the head showed a layer of cartilage about 0.5 cm. thick, which was normal except in its inner portion, where it formed the wall of the broken down bony center. Nearly all the adjacent cortical bone had been destroyed and replaced by connective tissue in varying degrees of organization, from mature fibrous tissue to loose granulations. Areas of old living bone were present in places, but showed some evidence of caries along the inner surface. There were a few cortical areas of newly formed bone. Small islands of dead bone undergoing lacunar absorption were scattered throughout the fibrous lining. In some areas cartilage was being absorbed from within outward. The

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(9) Archiv. Surgery, March, 1921.

material from the cavity disclosed a mixture of organizing connective tissue, granulation tissues and necrotic débris, in which were contained small sequestrums undergoing absorption. About the sequestrums were giant cell osteoblasts, but this was the only type of giant cell found. A section through the small portion of the excised cartilaginous epiphyseal line showed destruction of the bone on the epiphyseal side, but little change in the cartilage. The pathologic picture was that of an old, probably pyogenic infection, which had destroyed most of the bony center in the head of the femur.

This case showed a marked improvement in the center of ossification of the head of the femur. It regained part of its original thickness, the contour of the articular surface became more even and the interior almost completely filled with new bone.

Fracture of the Neck of the Femur. Royal Whitman[1] again describes in detail his method of treatment by abduction, inward rotation and fixation in a long plaster spica.

The main points in the use of this method are first, to reduce the shortening, preferably under anesthesia with the patient supported on a pelvic rest with a perineal bar. Manual traction reduces the shortening on the injured side. This is demonstrated by measurement. The surgeon meanwhile lifts the thigh upward if it is below the plane of its fellow. The limb is then rotated slightly inward, thus apposing the fragments. Both limbs, extended and under manual traction, are then abducted to the full limit, first on the sound side to demonstrate the normal range of abduction and to balance the pelvis. When this limit is approached on the injured side, the tension on the capsule aligns the fragments in a horizontal plane, and as the inner, or head fragment, is fixed by the acetabulum, finally forces the neck fragment against it. A long plaster spica is then applied which fixes the limb in complete abduction, full extension, and slight inward rotation, and insures the continued effectiveness of the anatomic splinting. The patient is put to bed with the head of the bed raised one or two feet. The patient is turned at intervals from side to side

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(1) Jour. Orthop. Surg., October, 1920.

and completely over to the ventral position without discomfort or danger of displacement, and thus bed-sores and hypostatic congestion may be prevented. The spica is retained for from eight to twelve weeks, or until it may be assumed that union is sufficiently firm to permit movement of the limb. After its removal the patient should remain in bed, devoting several weeks to muscular re-education and to the restoration of motion in the disused joints. Weight-bearing is not permitted until free and painless movements and *x*-ray examination indicate stability of repair. The treatment is thus rarely completed within a year, and if early locomotion is desired, a protective hip-brace should be provided.

[There is no question in the mind of the Editor that this work of Whitman's represents the greatest advance in the treatment of fresh fractures of the neck of the femur which has ever been made. The unfortunate fact remains, however, that the method is used by very few surgeons in any part of the world, principally because general surgeons and practitioners have not taken the trouble to familiarize themselves with the principles and details of the method and to provide themselves with proper plaster-of-Paris bandages and the simple form of pelvic rest necessary for the application of the spica. In almost any hospital in this country it is possible to find cases which are being treated with Buck's extension and sandbags or long side splints. This method of treatment should long ago have been relegated to the attic. The only method which compares at all favorably with Whitman's is the use of the Bradford abduction traction hip splint and it is probably true that the application and construction of this splint present difficulties which cannot readily be overcome by the average practitioner. Whitman deserves great credit for his efforts to popularize his method of treatment and it is to be hoped that he will live long enough to see it established as the standard routine in all parts of the world.—Ed.]

Treatment of Intertrochanteric Fracture of Femur. Kellogg Speed[2] treats of intertrochanteric fracture of the femur based on the study of 120 cases. By an intertro-

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(2) Amer. Jour. Surg., 1921, vol. 35, p. 123.

chanteric fracture is meant a fracture in which the main plane of bony separation passes from the tip of the greater trochanter obliquely downward and inward to or through the lesser trochanter. There may be impaction of the acetabular fragment into the shaft fragment or a comminution into two or more distinct fragments. The intertrochanteric constitutes about 24 per cent. of all femur fractures. Most cases were the result of a fall. Treatment was by rest in bed, sixty-five cases; Buck's extension and bed, twenty-three cases; plaster-of-Paris cast, plus legs in abduction, thirty-one cases; open operation, one case.

There were twenty deaths. The average age was 62 years. All the survivors except one obtained bony union and shortening was slight. Speed says that there is practically never any indication for open operation on an intertrochanteric fracture of the femur.

In mechanical analysis intertrochanteric fracture is a compression fracture caused by the direct trauma of a fall on the hip which sharply adducts the thigh.

A method of treatment for fractures above the middle of the femur when the upper fragment is flexed forward is described by B. F. Pendred.[3] The patient is placed in bed on his back, the head and shoulders being supported by two or three pillows. The knee of the injured limb is raised until the femur is at the required angle which is generally about 30° or 40° to the horizon. The knee is maintained in this position with a knee pillow or by a pyramid of sand bags. A ring-shaped air cushion is slipped over the foot, drawn up to the knee and inflated as fully as possible, the foot being allowed to fall back on the bed. A strong bandage is tied around the air cushion exactly opposite the knee and the other end carried to a pole or mast fitted to the foot of the bed. Strong traction is made in the line of the upper fragment, lower fragment, diameter of cushion, bandage and point on mast until the ring becomes definitely oval, when the bandage is fixed to the mast.

Pendred says that the method is simple, efficacious and little disturbing to the patient.

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(3) Brit. Med. Jour., 1921, p. 380.

Reconstruction Operation for Ununited Fracture of Neck of the Femur. Royal Whitman[4] describes an operation adapted to cases of fracture of the neck of the femur where reconstruction by bone graft is not practicable. The joint is opened and the atrophied head of the femur is removed. The stump of the neck is smoothed off. With a chisel the entire greater trochanter is split off diagonally from within outward and is then nailed or sutured to a position an inch and a half lower down on the outer side of the shaft, which has previously been bared of periosteum and the outer layer of the bone. This operation contrasts very favorably with Brackett's operation of placing the trochanter itself in the acetabulum, since by Brackett's method the femur must necessarily be held in a somewhat abducted position or else dislocation is likely to occur. Six cases are reported with very satisfactory results. The patients are able to walk well and strongly with little or no pain and very slight limp.

The injury and the reconstruction operation are shown in Figures 16 to 26.

Technique of Operation for Recent Fractures of the Neck of the Femur. C. Dujarier[5] has operated on seventy-eight fractures of the neck of the femur by the screw-fixation method of Delbet, in which he has, however, made some slight modifications. These modifications consist especially in the use of radioscopy and radiography during the course of the operation, and in a firm fixation of the patient to the operation table as well as a more solid fixation of the Delbet apparatus (Figs. 27 to 30).

A systematic following up and examination of these patients has shown Dujarier that secondary displacements are frequent, if not constant. The late displacements are: (1) the great trochanter is very frequently pushed up a few centimeters, perhaps a few weeks after operation; or even after some days; (2) there may be secondary deformation due to rotation of the head of the femur in the acetabulum; (3) or there may be torsion of the screw; (4) in some cases there is a slight reproduction of the external rotation.

These secondary displacements have no grave conse-

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(4) Surg. Gynec. and Obstet., June, 1921.
(5) Presse méd. May 28, 1921.

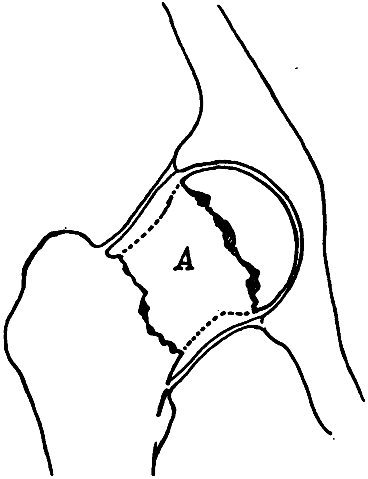


Fig. 16.

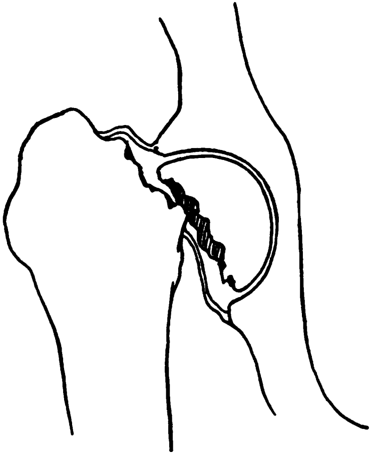


Fig. 17.

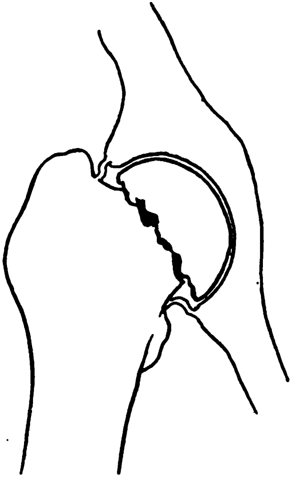


Fig. 18.

Fig. 16.—*a*. The area of the neck that is usually "absorbed" in ununited fractures of long standing.

Fig. 17.—The relation of the fragments in the ordinary type of ununited fracture. The shaft of the femur is displaced upward and adducted.

Fig. 18.—The fragments are apposed for direct repair, illustrating contact of the trochanter with the rim of the acetabulum, which checks abduction of the limb and causes functional disability, even when union is attained.

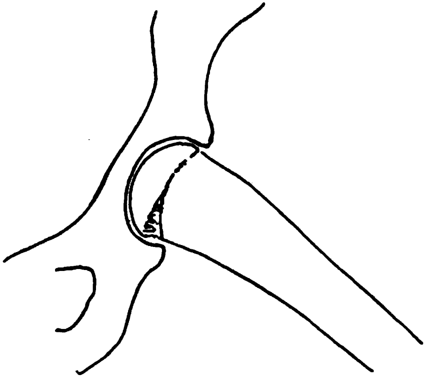


Fig. 19.

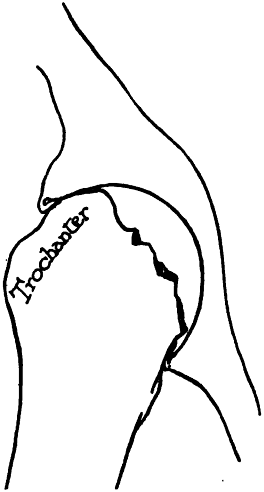


Fig. 20.

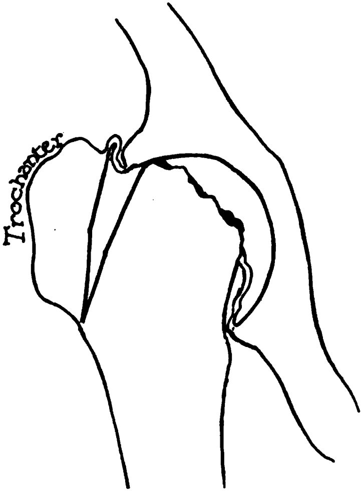


Fig. 21.

Fig. 19.—Brackett's operation. From roentgenogram "3 months after operation showing solid union between trochanter and head." The angle of abduction is about 40 degrees, and if this relation of the shaft and head persists it would appear that function must be seriously impaired, because with the limb in the line of the body the head must be displaced from the acetabulum.

Fig. 20.—The disadvantages of implanting the trochanter in the acetabulum after removal of the head are: ill adjustment, insecurity, and loss of motion.

Fig. 21.—The trochanter is displaced outward to permit the inclusion of the neck in the acetabulum (Albee), illustrating the limited area of support, the limitation of abduction and loss of muscular control.

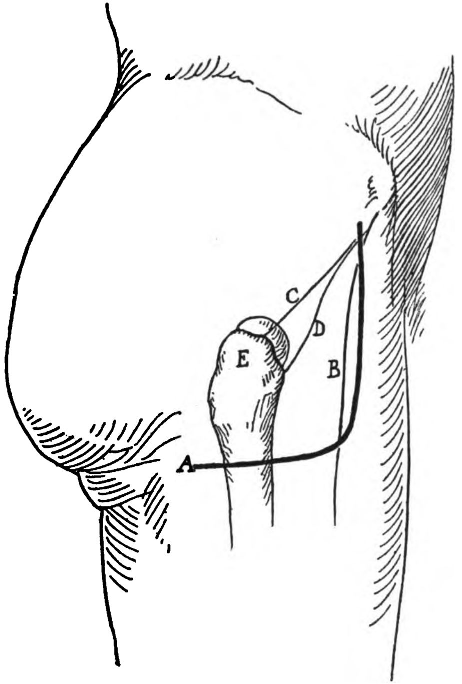


Fig. 22.—*a,* Line of incision; *b,* the tensor fascia femoris; *c,* the anterior margin of the gluteus medius; *d,* the anterior margin of the gluteus minimus; *e,* the trochanter.

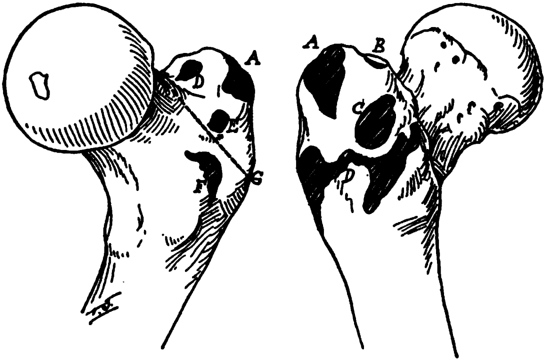
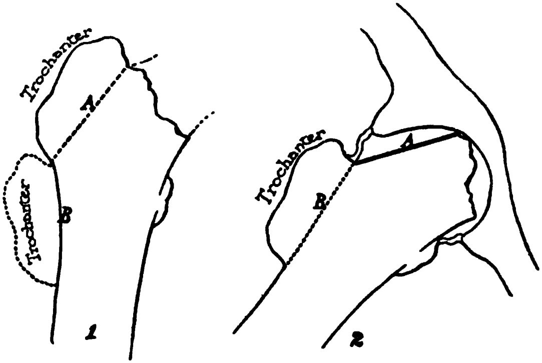


Fig. 23.—The muscular attachments of the trochanter. At left, the posterior and internal surface of the trochanter. *a,* Gluteus medius; *d,* obturator internus pyriformis, and gemelli; *e,* obturator externus; *f,* quadratus femoris; *g,* line of section. At right, the anterior and external surface of the trochanter. *a,* gluteus medius; *b,* pyriformis-obturator internus and gemelli; *c,* gluteus minimus; *d,* vastus.

quences. the functional results being very satisfactory. Dujarier thinks that on the whole the functional results in cases of fracture of the neck of the femur operated on according to the Delbet technique are incomparably su-



Figs. 24 and 25.—The reconstruction operation. Figure 24 (at left), the line of section of the trochanter and the point on the shaft to which it is to be transferred. Figure 25, the reconstructed neck.

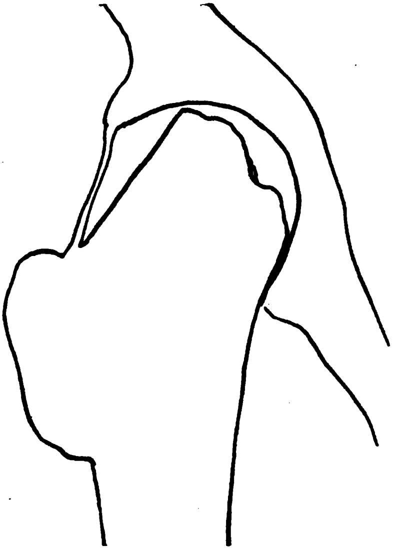


Fig. 26.—The relation of the reconstructed neck to the acetabulum in locomotion, and the leverage assured for the abductors. Contrast with Figures 20 and 21.

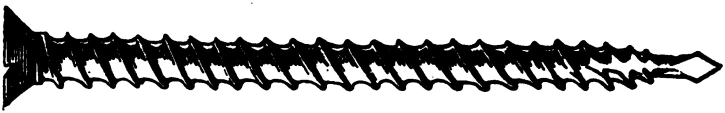


Fig. 27.—The screw, 9 cm. long. It terminates in a pointed tongue.

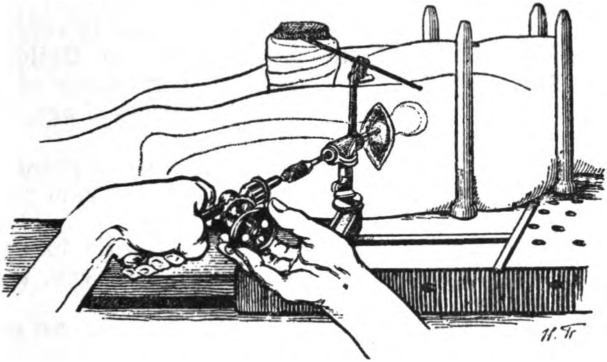


Fig. 28.—The apparatus of Delbet in place.

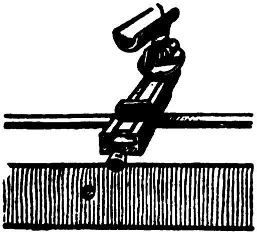


Fig. 29. — The index of Delbet is replaced by the demi-splint.

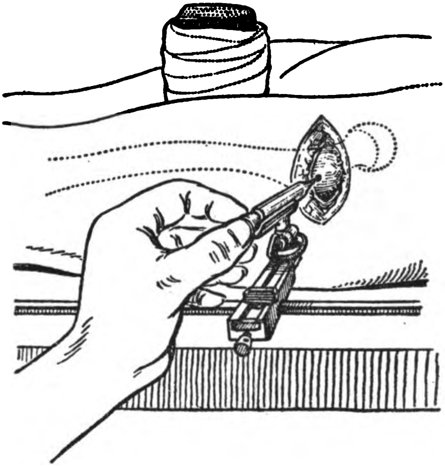


Fig. 30.—To fix the demi-splint in good direction a piece of wood exactly the diameter of the screw-holder penetrates the hole in the femur by its point.

perior to those given by classical methods. This is true of cervicotrochanterian fractures which cure normally with an osseous callus, and especially of transcervical fractures which, as Delbet has shown, almost always end in a pseudarthrosis with permanent disability.

In the author's eighteen cases, seventeen of the fractures were transcervical, and he thinks that this type is more prevalent than the text-books lead one to suppose.

Fracture of the Femoral Diaphysis in Children. Analyzing the results of treatment of fractures of the femoral diaphysis in children under 12 years of age, Kellogg-Speed[6] found that:

In twenty-five cases treated by overhead vertical extension the results were good or very good in nine; only fair or poor in sixteen.

In six cases of reduction under anesthetic followed usually by cast but without mechanical extension, there were four poor results.

Three cases treated by Buck's extension and cast gave poor results.

Eight cases of early reduction on fracture table with cast gave five poor results.

Eighteen cases of continuous suspension traction by Thomas splint and followed after some weeks by spica or splint; excellent or good results in nine; fair or poor in eight.

Six cases of continuous suspension in Thomas splint with caliper or nail in femur; excellent or good results in three, fair or poor results in three.

The Crucial Ligaments of the Knee: Their Function, Rupture and Operative Treatment. E. W. Hey-Groves[7] describes the anatomy and physiology of these ligaments. The anterior limits the forward movement of the tibia on the femur and is made tense by extension of the knee. The posterior checks the posterior displacement of the tibia which occurs during flexion. The author operated upon fourteen patients, in whom, after severe injury, the anterior ligament was torn in ten cases, the posterior in two, and both in two.

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(6) Surg. Gynec. and Obstet., June, 1921.
(7) Brit. Jour. Surg., 1920, vol. 7, p. 505.

When the anterior ligament is torn, the tibia can be moved forward passively on the femur. When the posterior is torn, the tibia can be moved backward passively on the femur.

Hey-Groves makes a large U-shaped incision for his operations in these cases. He chisels off the tibial tubercle and turns up the patella. A hole is then drilled through the external condyle of the femur and the front of the tibia. A long strip is dissected up from the iliotibial band, leaving it still attached to the tibia, and this strip is pulled through the hole in the femur into the intercondyloid notch and then through the hole in the tibia. and turned up onto the internal condyle, where it is fastened with sutures and an ivory nail. This strip thus reproduces quite accurately the anterior crucial ligament and also reinforces the internal lateral ligament.

The tubercle of the tibia is fastened in place by bone-screws and the wound is closed. This work is all done with the knee flexed.

A similar operation is done for the repair of the posterior crucial, using the tendons of the semitendinosus and gracilis and pulling them through the knee-joint through a hole drilled in the internal condyle, the knee being held extended while the tendons are pulled taut and fastened to the inner tuberosity of the tibia.

None of the fourteen patients was made worse by the operation. Four were not improved, four were somewhat improved, and four were practically cured. Two other cases are too recent to report.

[Corner has written upon this subject, also, and the operations described by him and by Hey-Groves are certainly ingenious and interesting. Very few cases of injury to the crucial ligaments have been reported in American literature. The Editor has operated upon only one case, a soldier at U. S. A. General Hospital 28, whose anterior crucial had been torn loose, carrying with it a good-sized piece of the spine of the tibia. A patella-splitting incision was made, and excellent access was obtained. A hole was drilled through the piece of bone torn from the spine of the tibia, and an ivory nail was driven through it and into the substance of the tibia at the original site of the spine. It fitted well, and seemed very firmly fastened, but it has been reported that union did not take place.—Ed.]

Wounds of the Knee. J. Okinczyc[8] reports on sixty-four wounds of the knee on which he operated, and which he dressed, and followed in their evolution. Forty-eight patients were treated in a base hospital and all except two were infected on arrival and operated on only after long delays; thirty-nine recovered and nine died. The sixteen others were treated in Okinczyc's ambulance, fourteen being operated on within one hour of injury. Only two were infected; thirteen of those operated on immediately recovered without inflammatory reaction, the reunion being *per primam.* One case became infected and the leg had to be amputated. All sixteen patients recovered. In the first series of forty-eight patients an arthrotomy was done twenty-seven times, a resection twenty times, and amputation five times; in the second series of sixteen patients there were nine arthrotomies, eight resections and one amputation.

It was infection and infection alone as manifested in the first series which has created the difference in surgical treatment and changed the quality of the results. Early operation is the true factor of the aseptic rapid recovery in the second series. The nine deaths in the first badly infected series followed three amputations, one resection and five arthrotomies with limited resections. In the thirty-nine recoveries of the first series, twenty-three showed ankylosis. In the second series with *per primam* recovery all thirteen patients had good active and passive movements.

Resection of the Upper Part of the Tibia and Its Substitution by Piece Removed from Femur. In a case of cystic sarcoma of the upper third of the left tibia, E. Juvara[9] resected the diseased part of the tibia and immediately re-established the bone continuity by a graft removed from the lower part of the corresponding femur. After making the necessary measurements of the length of bone graft required to fit from the condyle to a notch or rest cut in the head of the resected tibia, the femur

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(8) Presse méd., Aug. 21, 1920.
(9) Ibid., March 26, 1921.

was cross-sectioned at the required height above the condyle for half its thickness and this cut was met by another proceeding up from the condyle along the length of the bone. The femur was practically sawn in two. The sectioned piece of bone was moved down to the notch cut in the tibia and fixed either by wire or nails.

Radiographic examination of the patient four years later showed the tibia and femur of almost normal aspect and the limb solid. The patient walked well with the aid of a cane, the knee being encased in a leather covering. The graft was seen radiographically to be much thickened and separated from the condyle of the femur by a true articular interline.

The stages of the operation are shown in Plates VII and VIII.

Treatment of Fractures of Diaphysis of Tibia. This article by H. Collen[10] gives a detailed description of Delbet's ambulatory apparatus and the methods of its application in different cases. The author says that the apparatus is suitable to all types of fractures, including

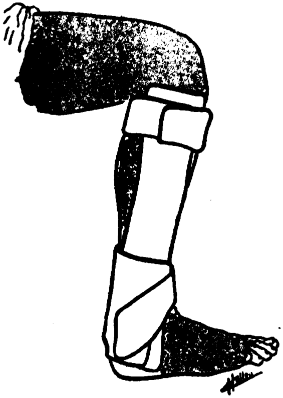

Fig. 31.—In the Delbet method, the fracture area being well isolated from the knee and instep, the patient walks without any metal or plaster being interposed. All the muscles and joints work actively.

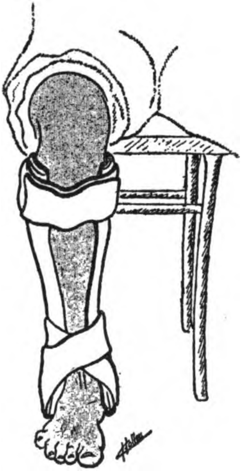

Fig. 34.—The patient should be seated, the knee and foot well flexed.

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(10) Presse méd., Dec. 22, 1920.

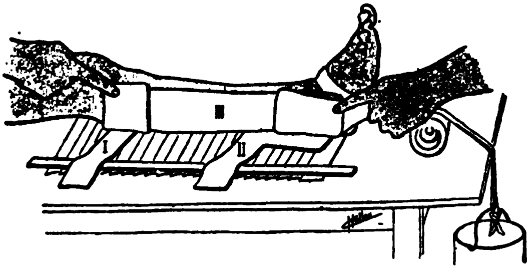

Fig. 32.—Showing the method of applying the longitudinal splints on each side of the leg.

multiple fractures; that it is in every way superior to immobilization in plaster casts; and that the best results may be expected when certain errors in the methods of use are avoided. The technique is shown in Figures 31, 32, 33, and 34.

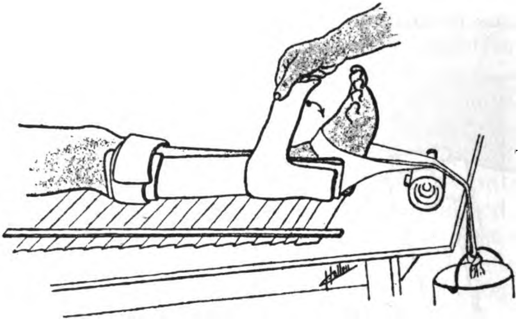

Fig. 33.—There is always a tendency to place the upper band too near the patella. It should pass over the anterior tuberosity and should not be too tight so as to avoid risk of strangulation.

Fissure Fracture of the Tibia. J. Grossman[1] treats of twenty-one fissure fractures. These are subperiosteal or intraperiosteal fractures in which the bone breaks or cracks without tearing the periosteal covering. They are almost always in the tibia. Ten of Grossman's cases were in the right tibia and eleven in the left.

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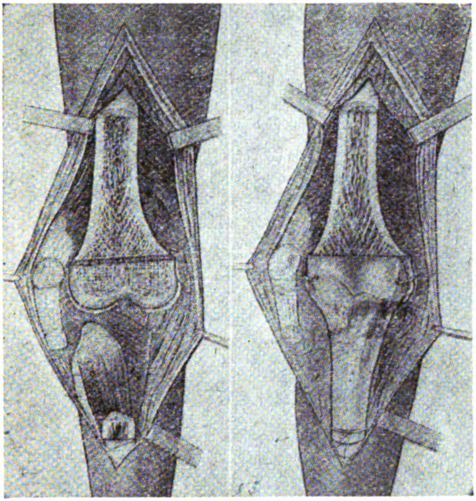
(1) New York Med. Jour., Sept. 11, 1920.

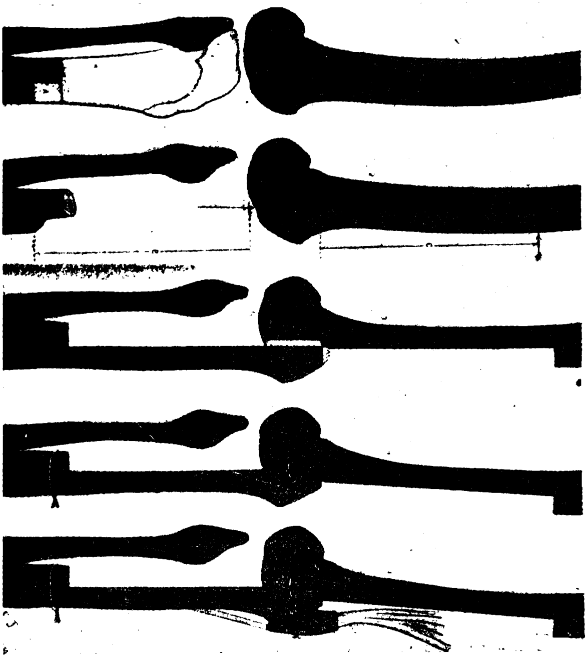
PLATE VII.



A.　　　　　　　　　　B.

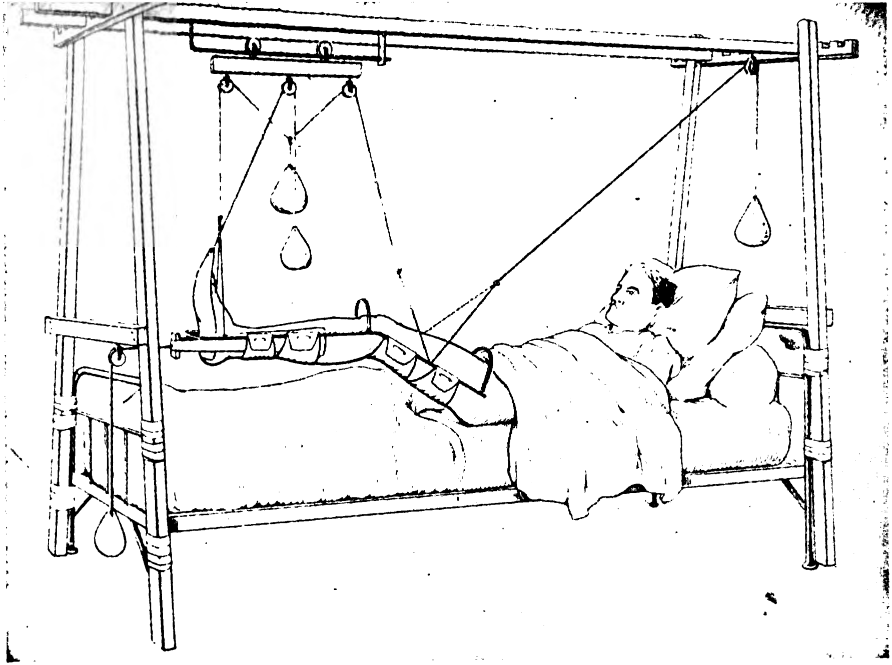
A. After splitting the lower part of the femur, a ledge is prepared on the extremities of the femur and tibia.
B. Fixation of the graft by sutures.—Juvara, page 254.

PLATE VIII.



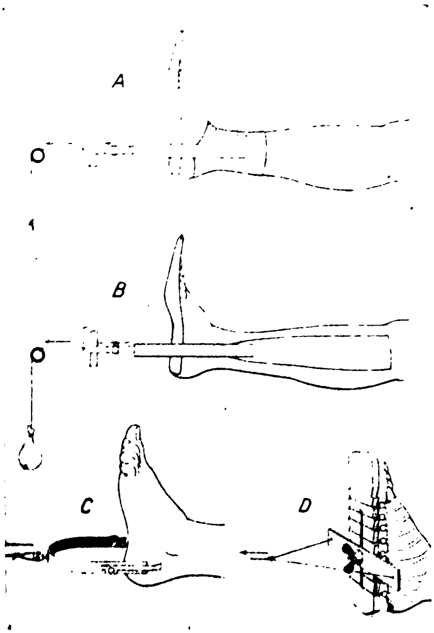
The different stages of the operation seen from the external side.—Juvara, page 254.

PLATE IX.

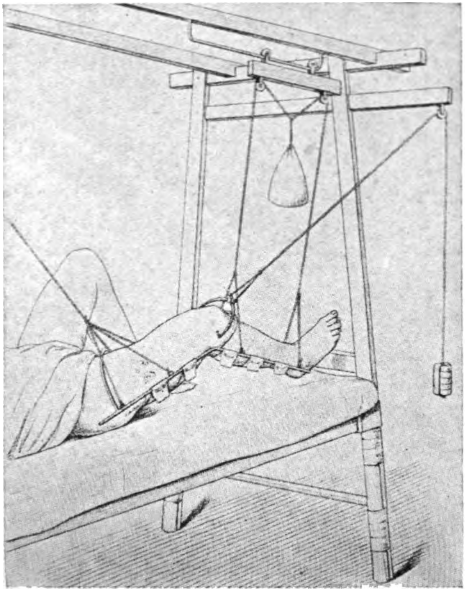


Illustrating the method of suspension in fractures of the lower leg. The splint is bent to about 135°. The middle suspension cord is attached too far up the splint, which would balance better if this cord were attached nearer the knee.—Webb, page 259.

PLATE X.



A. Illustrating four methods of obtaining traction in fractures of the leg.



B. Showing the arrangement for a fracture of the upper third of the femur. A Besley tongs has in this case been used. Note the flexion at the knee, the abduction and external rotation. The arrangement for the control of foot drop has not been figured.—Webb, page 250.

Regarding these fissure fractures Grossman concludes:

Fissure fracture occurs mostly in children.

The tibia is usually the site of the fracture, only one case having been seen in the fibula.

The subjective symptoms and the disability may be mild.

Fissure fracture should be differentiated from sprains and contusions.

The presence of a luetic infection in the bone, as a factor prolonging the duration of the symptoms, should not be overlooked.

False mobility, crepitus and deformity are always lacking in this type of fracture.

The diagnostic objective symptom is pencil tenderness. It is always present and persists for an indefinite period of time after the accident has occurred.

The recognition of the type of fracture is important, not only from a scientific viewpoint, but also from a medicolegal viewpoint.

Treatment of Rachitic Deformities of the Tibia. Seeing that severe rachitic deformity of the tibia, when non-amenable to bloodless methods of correction can only be treated with slight success by ordinary methods of osteotomy, C. Springer[2] has tried a new method of segmentation in multiple discs of the deformed bone tract. His efforts have been successful.

It is not possible to perform three consecutive osteotomies when it is only a question of a discreet amount of correction in a limited bone segment without irregular fragmentation of the bone and projecting some bony spiculae into the musculature. Even the Gigli saw can not be used since it drags away bone chips. Resection of the deformed tract and substitution of a Mosetig filling for the defect is dangerous, as the filling may be expelled and a nearthrosis formed. All these inconveniences are obviated by having recourse to section of the deformed tract in small segments, which being then superimposed and turned about and fitted in a suitable way restores the rectilineal corrected aspect.

The skin incision is such that the healthy bone is exposed for about 2 centimeters at each extremity of the

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(2) Zeitschr. f. Orthop. Chir., 1920, vol. 60, 20.

deformed tract, the periosteum for the whole length is accurately elevated all around and the osteotomy done above and below. The deformed bone fragment thus isolated is extracted from its periosteal bed, fixed in a vise and sawed into discs about 1 centimeter thick and with parallel surfaces. The fibula being then fractured, traction is exercised upon the limb and the bone segments replaced in the periosteal bed in such a way that by moving them around suitably, a complete linear correction is obtained. To maintain the discs in the required position the periosteum is sutured with silk and the limb immobilized in a fenestrated plaster cast. An elongation of from 2 to 3 centimeters of the limb can thus be obtained; the patient may be permitted to walk after six weeks, an orthopedic supporting apparatus being carried for the first week.

Radiographs show that this method has given the author some excellent results. Rigorous asepsis is necessary in all manipulations of the extracted bone fragment and the use of instruments is recommended so that contact is avoided. The method is not applicable to the femur since it is too much covered by muscle.

Operative Treatment of Osgood-Schlatter Disease. Soule in 1917 operated on a case of Osgood-Schlatter disease by a graft taken from the tibial cortex and inserted in a trough cut in the tibial tuberosity. The patient made a good recovery and walked without discomfort. Some authors are of opinion that the Osgood-Schlatter disease does not need any operative interference as it recovers spontaneously.

S. Solieri[3] has tried Soule's method in a personal case, a boy of 12, in whom after radiologic and clinical examination the diagnosis of Osgood-Schlatter disease was made. The result showed that this operation was efficacious in curing the anatomic lesion and causing disappearance of the clinical symptoms. The boy was walking well a month after operation. This result is all the better when considering the long time elapsed before children treated by non-operative methods show themselves free of the symptoms. The author thinks also that the dystrophic disturbances in these patients suggest endocrine

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(3) Chirug. d'org di movimento, 1921, vol. 5, p. 353.

secretion imbalance. He treated his own patient postoperatively with thyroid extract on this account.

The Use of the Thomas Splint. D. A. Webb[4] thinks that one of the most useful lessons for civilian surgery learned from the experience of the war was the use of the Thomas splint in fractures of the lower extremity, more particularly of the femur. To illustrate his views Webb quotes the results of the use of the Thomas splint in the British Army during the war.

"At the close of the war there were 5,000 fractured femurs in the British army. In 1916 the mortality from thigh wounds was 80 per cent. In 1917 Thomas splints were issued to the stretcher bearers. Then cases arriving at the casualty clearing stations, instead of being shocked and moribund, were ready for immediate operation. The death rate from thigh wounds dropped to 15 per cent. Later, special femur hospitals were established, when the rate was further lowered because of fewer secondary hemorrhages and less sepsis, gas gangrene and general traumatism.

The following review was made after the general adoption of the Thomas splint:

Knee joint—Over 90 degrees flexion—81 per cent.
60 to 90 degrees flexion—14 per cent.
30 to 60 degrees flexion— 4 per cent.
Lengthening of femur—7 per cent.
Shortening of femur—36 per cent.
Without any shortening—57 per cent.

The figures for 1918 will undoubtedly show far better results."

The average shortening in the special femur hospitals in France in 1918 was one-fifth of an inch.

"That is a significant statement in view of past results, with simple fractures, with unlimited apparatus, unlimited time and unlimited help available. It is so pregnant with meaning that a change is inevitable and the teaching of the principles of treatment of fractures in general and of their practical application must be vastly improved if ordinary justice is to be done to fracture cases in the future."

The apparatus is shown in Plates IX and X.

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(4) Penn. Med. Jour., June, 1921.

The Foot

Removal of the Astragalus in Paralytic Feet. This paper presents the end-results of 217 cases of infantile paralysis in which the astragalus was removed for a paralytic condition of the foot resulting in lateral instability and various other deformities. The author, J. W. Sever,[5] does not wish to condemn the "Whitman operation," astragalectomy, but to warn the optimistic and to strengthen the conservative operator by showing end-results in some cases in which this operation has been done.

The object of the operation is to restore symmetry and stability of the foot and in these cases, done by eight different surgeons, the author believes he finds proof that the object is not attained in every case. He believes that the operation is not indicated in simple varus or valgus represented by moderate instability, or a flail foot, a foot with only one muscle-group left, in which there is persistent deformity in weight bearing, or a complete flail leg and foot. He especially emphasizes that increased shortening resulting from astragalectomy and a stiff ankle are not going to make much actual difference in function, as braces will always have to be worn.

An analysis of the cases reported, in his opinion justifies the following conclusions:

Astragalectomy is not an operation to be advised for any foot with lateral instability a result of paralysis of one muscle group alone. The lateral instability of the ankle may be averted but more subsequent deformity may develop.

It is as good operation as any in feet which are flail or those which have only one muscle group left.

It is not an operation that will cure or improve a limp, as a rule.

It is not an operation to be advised lightly or invariably for foot deformities, but should be performed on older children in selected cases.

The best results are obtained in those feet in which there is good muscle power before operation and where after operation there is good motion between the tibia

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(5) Jour. Amer. Med. Ass'n., Oct. 30, 1920.

and os calcis and good weight bearing position of the foot.

[In properly selected cases, the Whitman operation of astragalectomy and *backward displacement* of the foot is by all odds the best operation yet devised. For cases with marked varus tendency, an arthrodesis of the subastragaloid, astragalo-scaphoid, and calcaneo-cuboid joints, will be found very satisfactory.—Ed.]

Symptoms and Treatment of Pes Cavus. A. Steindler,[7] discusses this deformity. Clinically, it is characterized by the following cardinal points:

1. An increase in the height of the longitudinal arch.
2. A dropping of the anterior arch with plantar flexion of the front of the foot.
3. Dorsal retraction of the toes, with hyperextension of the proximal phalanx and flexion of the other phalanges.

Some of the cases are due to infantile paralysis, some to spastic paralysis, some to developmental arrest, and some to static or other causes.

The operative treatment proposed is applicable to those with well-functioning triceps surae muscles, with no relaxation of the Achilles tendon. There is very seldom a true equinus deformity. The bend in the foot is usually at the astragaloscaphoid joint, but in a few cases there is an actual downward bending in the neck of the astragalus.

Technique of Operation: A curved incision is made on the inner side of the foot from the back of the heel to a point well in front of the anterior process of the os calcis. The thickened plantar fascia is exposed in its full width, the whole length of the incision. Many fibrous strands running from the fascia into the subcutaneous tissue must be severed. Blunt dissection is then made until the space between these short muscles of the foot and the flexor of the big toe is reached. A grooved director is passed between the two. The plantar fascia is next incised transversely at the line of insertion into the os calcis, and the fascia and attached short muscles are stripped off subperiosteally from the under surface of the os calcis. This stripping should extend far enough for-

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(7) Archiv. Surg., March, 1921.

ward to include the inferior calcaneo-cuboid ligament, or ligamentum plantare longum, since this is largely responsible for the cavus deformity on the outer border of the foot. The contraction in the sole being thus corrected, a cuneiform osteotomy is performed through an incision on the dorsum of the foot, between the extensor of the big toe and the common extensors. The head and neck of the astragalus are exposed, and a suitable wedge is removed, extending laterally through the cuboid calcaneal region. Whether the osteotomy is performed through the neck or through the head of the astragalus depends on the site of the plantar deflection in the individual case.

[It is much better to make the wedge-osteotomy directly through the astragaloscaphoid joint and the calcaneo-cuboid joint, since the resulting ankylosis in these joints will effectually prevent any recurrence of the deformity.—Ed.]

After these procedures the hollow-foot deformity should be easily corrected. The claw-toes can now be straightened by tenotomy of the extensor and of the long flexor of the big toe, as well as of the common extensors of the other toes. In some cases these tenotomies may not be necessary. In very extreme cases, extensive operations on the heads of the metatarsal bones may be necessary to permit the straightening of the toes.

[At the section on Orthopedic Surgery of the American Medical Association, in June, 1919, R. A. Hibbs read a paper on "Claw-Foot," pointing out clearly, and for the first time, the fact that the chief deformity occurs at the mediotarsal or astragaloscaphoid joint, instead of at the tarso-metatarsal articulations. He advised the stripping of the os calcis after the Steindler method, and also the fixation of the toe extensors into the external cuneiform bone. In the discussion which followed, J. P. Lord and the Editor of this Year-Book, Ryerson, urged that a cuneiform osteotomy in the astragaloscaphoid region be also performed. This paper and the discussion were published in the *Journal of the American Medical Association*, Nov. 22, 1919, page 1583. Steindler does not refer to this in his article, and it probably escaped his notice. The Editor has seen many unsatisfactory results follow the Sherman operation of plantar fasciotomy and transplantation of the toe extensors into the distal ends of the corresponding metatarsal bones, even by the later improvements on Sherman's technique; and he has seen excellent results follow the same operation with the addition of cuneiform osteotomy through the astragalo-scaphoid and calcaneo-cuboid joints. Steindler's method of stripping the os calcis is a distinct and creditable advance over the older fasciotomy, and should be used to the exclusion of fasciotomy in the operative treatment of hollow-claw foot.—Ed.]

End Results of Operation for Hallux Valgus. H. Olivecrona,[8] reports the late results in seventy feet operated upon by different methods.

Schede's method was used in twenty-nine cases. This consists in simply chiseling off the deformity on the medial side of the head of the first metatarsal bone, removing the bursa, and excising an elliptical piece of skin over the head, with tenotomy of the extensor hallucis if necessary. Of the cases, 62 per cent. were entirely relieved, 20 per cent. greatly improved, and 18 per cent. were not satisfactory. One of those classed as greatly improved had a good result for seven years, but after that time the trouble recurred.

Thirty-four patients were operated on by the Mayo method. the head of the bone being resected and a bursal flap interposed between the phalanx and the head; 88.4 per cent. were entirely relieved of symptoms. One patient had almost complete ankylosis of the joint, but suffered no inconvenience in consequence. The results were better in cases in which the head was carefully smoothed off than in those in which the head was simply chiseled off without any smoothing of the surface. The deformity recurred in only one case. A few patients had trouble with the arch, either metatarsal or longitudinal.

Reverdin's method of wedge-shaped osteotomy was used in three cases, and in each case there was recurrence.

Hueter's method of excision of the entire head was done in four patients, none of whom was entirely cured. In two the joint-motion was limited, in one there was

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(8) Acta chirurg. Scand., 1921, vol. 53, p. 354.

almost complete ankylosis. Two patients had arch trouble, and in one this was very painful. The valgus deformity of the toe did not recur in any case.

The conclusions are that Schede's operation affords the greatest probability of relieving pain, but that the deformity is not always corrected. Convalescence is more rapid than after the other operations mentioned, the patient being usually able to walk in three or four weeks. This operation is not adapted to cases in which the valgus deformity is more than from 30 to 45 degrees. Mayo's operation gives usually good results, but is more likely to be followed by arch difficulties. Hueter's operation is more apt to cause ankylosis than any of the others.

A similar study of end-results was made by H. W. Spiers[9] in ninety-six patients operated upon by different methods. Seventy-eight of these were resections of the metatarsal head; 61 per cent. were satisfactory and the rest were unsatisfactory. Of the latter group, 56 per cent. had unsatisfactory after-treatment.

Eight cases had only the exostosis removed. Six of these patients were wholly dissatisfied with the result, and two were partially satisfied.

Seven cases done by the Kellar method were satisfactory, and the examinations showed good results. This operation was described by Col. W. L. Kellar,[1] of the regular army medical corps, and is performed as follows:

An inverted U-shaped incision, avoiding the bursa. The head of the metatarsal is exposed sub-periosteally (*sic.*) and the exostosis is widely excised, the greater portion of the dorsal surface of the head also being removed. The proximal end of the proximal phalanx is next removed for a sufficient distance to allow easy correction of the deformity. A careful dissection of the capsular and ligamentous attachments is made before the resection of the bone. The joint is preserved by the cartilage on the end of the metatarsal head, and by fastening the capsule, ligaments and soft parts over the excised end of the phalanx. This method, therefore, preserves the weight-bearing surface intact, at the bottom of the metatarsal head, corrects the valgus deformity by shortening the

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(9) Jour. Amer. Med. Ass'n., July 31, 1920.
(1) New York Med. Jour., April 6, 1912.

toe and removing the exostosis, and interferes but little with the muscular attachments. It is to be regretted that only seven cases were included in the report, since the results were so uniformly good that a longer series would have been more conclusive.

Spiers' conclusions are worth repeating:

By the excision method, about two out of three (patients) will be pleased.

By this method, favorable results depend to no small extent on the after-treatment (traction, plates, etc.).

By this method, those whose occupations are sedentary can be assured of a satisfactory end-result.

The anterior arch is the trouble-maker in excisions, and loss of the normal range of motion is the rule.

Proper arch-supports are essential in after-treatment in excisions.

Bony overgrowths interfere frequently with a satisfactory end-result.

The removal of the exostosis, *per se,* is rarely justified.

The Kellar method seems to offer a distinct advance in the operative treatment of hallux valgus.

In connection with these papers, it is interesting to read what our English colleagues have to say. Mark Jansen, of Leyden, Holland, read a paper before the British Orthopaedic Association in June, 1920. He considers that hallux valgus is generally due to the wearing of improper shoes. Treatment by transplantation of the abductor hallucis has "proved useful to him." In more severe cases it may be combined with shortening of the first metatarsal according to Ludloff's method, or by removal of part of the metatarsal neck. He then asks for an expression of the views of the British surgeons upon the method of removal of the metatarsal head.

Mr. Elmslie states very emphatically that, after having tried all the recognized operations, he is convinced that there is only one successful operation for hallux valgus, and that is, complete removal of the head of the first metatarsal.

Mr. Naughton Dunn removes the exostosis in the milder cases, and in the more severe he trims the metatarsal head and removes a half of the base of the proximal phalanx. When the sesamoid bones are adherent to the metatarsal head, they should be removed and the under surface of the head levelled.

Mr. Bennett finds the excision of the head most gratifying, and knows of no other operation which compares with it.

Mr. Laming Evans opens the joint by a dorsal incision, exposes the head and looks at the cartilage. If there is a lateral exostosis and a good cartilaginous surface over the rest of the head, he removes the exostosis; if the rest of the cartilage is diseased, he removes the head.

Sir Robert Jones has had a series of cases in which he took out a wedge just behind the head of the bone, but the results were not always satisfactory, and he has come back to the firm conviction that the most satisfactory operation is the complete removal of the head of the bone. The removal of the prominent portion alone has often resulted in recurrence (*Journal of Orthopedic Surgery,* March, 1921).

[It is evident that the last word has not yet been written in regard to the treatment of this very common disability. Olivecrona's description of the Mayo technique is not correct, for he quotes it as an excision of the metatarsal head, whereas, in most cases, only the distal portion of the head is removed in the Mayo operation, leaving a small portion for weight-bearing. Many surgeons besides Olivecrona have made the same mistake, and perform a Hueter excision with the interposition of the bursal flap, and consider that they have done the Mayo operation. There is little doubt that the general surgeons (who perform the vast majority of the operations upon the cases of hallux valgus) are strongly in favor of complete excision of the metatarsal head. The deformity is practically always removed permanently by this operation. It is not to be doubted that nearly all the patients are satisfied with the result, but it is also true that the removal of so important a part of the weight-bearing and arch-forming portion of the metatarsal bone must have a certain deleterious effect upon the functional capacity of the foot. That this sometimes leads to serious consequences is well-known to most orthopedic surgeons, who are perhaps in a better position to study the late results than are most of the general surgeons. Disabling rigidity and hyperextension of the proximal phalanx have been frequently seen by the Editor as the sequel of both the Hueter and the Mayo operations, and are possibly due to the failure of the operators to use traction for a reasonable time after the head of the bone has been removed or denuded of cartilage. A plain wire splint can be used to great advantage for two or three weeks after operation, and will almost never fail to preserve normal mobility.

The operation of Colonel Kellar seems to present fewer objections than any other of those which might be termed universally adaptable, although it seems likely that plantar flexion might be interfered with in some cases.

The simple removal of the projecting portion of the medial side of the head, with lengthening of the toe extensor, is amply sufficient for very many of the milder cases, where most of the pain is caused by the pressure of the shoe against the bone. It is useless, however, to perform this simple operation unless the patient understands clearly that proper shoes must be worn throughout the rest of her existence, since if the same kind of shoes that produced the deformity are worn after the operation, there is a strong probability that recurrence will take place.

Every year or two some one evolves a new theory as to the cause of hallux valgus. J. J. Monahan[2] thinks that the common theories as to the cause, such as improperly shaped shoes, dislocation of the sesamoids, and heredity, are to be rejected. In regard to the latter two causes, the Editor heartily agrees with him. Monahan has noted in the *x*-ray pictures three abnormal conditions:—abduction and outward displacement of the phalanx; enlargement of the internal lateral portion of the head of the metatarsal; and adduction of the metatarsal. He believes that the latter condition is the cause of the other two abnormalities, and that the reason for the adduction of the metatarsal is a wedge-shaped development of the internal cuneiform bone at its anterior end. At times this wedge is a separate bone, called by Piersol the os intermetatarseum, and in other instances it is fused with

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(2) Med. Times, 1920, vol. 68, p. 149.

the cuneiform. Monahan thinks that the intermetatarseum is one of the stigmata of degeneracy.

This theory of the cause of bunions is by no means new, as James K. Young of Philadelphia advanced it at a meeting of the American Orthopedic Association in June, 1909. His paper was published in the *American Journal of Orthopedic Surgery,* in February, 1910, and was entitled "The Etiology of Hallux Valgus, or, The Intermetatarseum." In 134 fresh skeletons of feet he found seven cases of hallux valgus, with obliquity of the articular surfaces. He cites Thomas Dwight's classification of the four varieties of the intermetatarseum, and adds a fifth of his own.

To the clinician who every year sees large numbers of persons who have well-pronounced lateral deviations of the first metatarsal bone, the etiology of hallux valgus seems to require no elaborate studies or theories. The condition can be so logically and clearly demonstrated to be due to improperly shaped or fitted shoes that it is a waste of time to search for other causes. It is perfectly true that the immediate ancestors of many patients can be shown to have had hallux valgus. This proves nothing whatever as to heredity except that the parents or grandparents had the same partiality for pointed shoes that is present in the descendants, or else that the shoemakers had a hereditary tendency to make abducted shoes.

Most of the shoes sold in America are so shaped that the great toe is pushed outward, away from the other foot. As the wearer walks, the foot tends to slide forward, especially when high heels are used. The toes are crowded into the end of the shoe, and the base of the first phalanx pushes backward against the outer side of the metatarsal head. This force inevitably makes the distal end of the metatarsal deviate inward, spreading the "ball" of the foot more or less widely. Shoes that are short as well as pointed do the work still more rapidly. There is nothing mysterious about it. It is not due to an intermetatarseum or an os tibiale externum or a pre-hallux, any more than is flat-foot, although J. T. Rugh[3] has written a pleasant paper in which he suggests that flat-foot may be caused by the two latter conditions.

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(3) Ann. Surg., April, 1921.

The Editor's opinion, then, is that hallux valgus is caused, in the enormous majority of cases, by static and easily preventable conditions. There is no valid excuse for the existence of these conditions, but the makers of fashionably shaped shoes declare that they can not induce most people to purchase shoes which are shaped along the lines of the normal foot. It was hoped that the large numbers of young men who wore the Munson last during the war would be able to convert some of their friends of both sexes, but such is not the case, and the autumn models of shoes now on display in the popular shoe stores would discourage the most cheerful optimist.—Ed.]

Operations for Club Foot. F. R. Ober[4] describes an operation which has been found extremely useful. An incision is made from above the malleolus over the inner aspect of the ankle-joint, curving downward below the malleolus and then upward to the internal cuneiform. The periosteum is elevated and detached from the lower medial surface of the tibia, including the deltoid ligament. The tip of the sustentaculum tali is also cleared of ligaments and periosteum. The astragaloscaphoid ligament is removed from the scaphoid. The plantar fascia is divided subcutaneously. The abduction of the foot is corrected by manipulation and the inversion and plantar flexion are then overcorrected. The tendo Achillis is then divided subcutaneously. This operation directly overcomes the median rotation of the astragalus and os calcis and probably does it better than can be accomplished by any less careful dissection. It lengthens the foot and injures no important vessels or nerves. The postoperative treatment is the same as after any other open club foot operation.

R. G. Elmslie[5] considers this subject. He believes that tenotomy has been much too freely employed, since in most cases it is perfectly easy to correct or to over-correct the deformity in a child under one year of age by simple manipulation under an anesthetic, repeated if necessary on two or more occasions, with retention of the foot in plaster-of-Paris between the manipulations. The great advantage of avoiding tenotomy is that the ultimate

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(4) Jour. Orthop. Surg., October, 1920.
(5) Ibid., December, 1920.

function of the foot is thereby much improved. He describes his manipulations in detail. They differ in no respect from those ordinarily used in this country. The varus deformity must always be completely overcome before the equinus is attacked. The knee must always be flexed to a right angle and included in the plaster-of-Paris dressing. After full over-correction has been made the foot is forcibly manipulated each day and a simple club foot shoe may be used. It is not always possible to correct the equinus deformity by manipulation alone and it is wise to delay this until the child is nearly a year old, when the tendon is large enough to allow of a subcutaneous lengthening operation. A premature correction of the equinus by division of the tendo Achillis leaves an imperfect foot, very liable to relapse, which it is exceedingly difficult to correct satisfactorily by any subsequent operation. In old or relapsed cases an open operation must be done. The capsule of the astragaloscaphoid joint must be cut completely across. The tuberosity of the scaphoid must be cleared upon its posterior and inferior aspects, the sustentaculum tali cleared and the tibialis posticus tendon divided. The os calcis is then divided with an osteotome transversely about one-half inch behind its anterior border. The whole of the anterior part of the foot can now be abducted and elevated. If necessary, the neck of the astragalus may be divided. The foot is then corrected and placed in plaster, including the knee-joint. If internal rotation of the entire foot exists, Elmslie does not hesitate to correct it by division of the tibia and fibula.

Pain in the Great Toe from Adhesions of the Internal Sesamoid Bone. Roland Hammond[6] reports two cases of pain in the great toe which proved in both cases to be due to adhesions between the internal sesamoid bone and the head of the first metatarsal bone. Both of these patients had constant pain accurately localized at the region of the internal sesamoid. Both were treated by proper shoes, supports for the anterior arch, baking, electrical treatments, etc. Upon the evident failure of conservative treatment, operation was performed and the internal sesamoid was found adherent to the head of

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(6) Jour. Orthop. Surg., September, 1920.

the metatarsal. Several shallow depressions were found in the head of the metatarsal. There was loss of cartilage and the depressions were filled with detritus. It could not be determined that they had any connection with the adhesion of the sesamoid to the metatarsal as they existed posterior to the articulation. Both operations were entirely successful. In one case the patient returned some months after operation and complained of a similar condition in the opposite foot. This foot was accordingly operated upon and again adhesion of the sesamoid was found.

[Hammond's observation is extremely interesting. All of us have seen cases of obstinate pain in the situation described and in many cases with production of a painful corn or callus. The Editor has several times removed sesamoids which were obviously causing trouble but has not as yet observed adhesion of this bone to the metatarsal.—Ed.]

BONE SURGERY

Internal Splinting of Bone. P. B. Magnuson[7] compares various methods of internal splinting in transverse fractures. Two forms of cortical bone splints have been popular; Lane's steel plate, and the Broughton and Ecke plate of beef-bone fastened in with bone screws. These both act on the same mechanical principle, being screwed on one side of the bone; they do not give even support in all planes, unless one can be placed on each quadrant, which would make four plates to a bone. This, of course, is out of the question from a surgical standpoint. Steel does not usually maintain close contact with bone for any considerable length of time because of a pressure necrosis of the cells in immediate contact with the steel, especially the screws. The oxide of iron which is produced is also an irritant and there is a collection of serum around the plate, which is a fertile field for infection at any time. It is Magnuson's opinion that it is on account of this irritation of the tissues by the plate that so many infections occur as a result of its use, and

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(7) Northwest Medicine, December, 1920.

not that the infection is introduced at the time of operation, since the accumulation of serum around the plate is an extremely favorable breeding place for any colony of bacteria which may be floating in the blood.

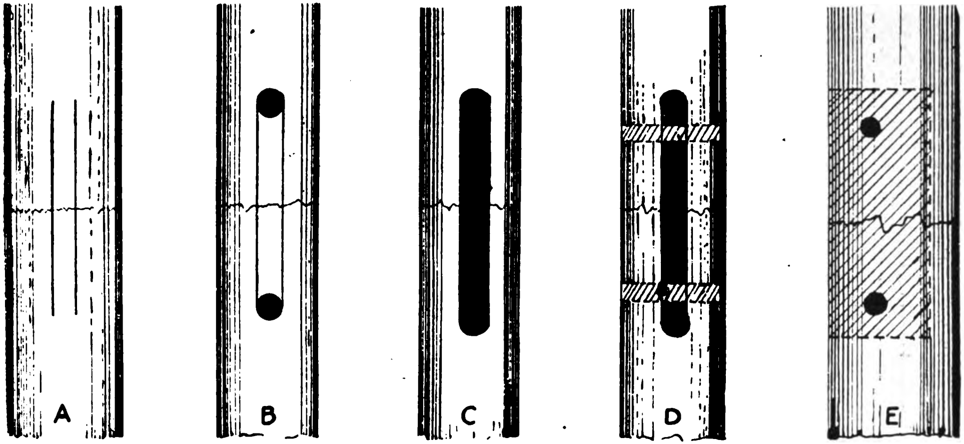
[This will make a great many surgeons feel much more comfortable than they should be made to feel. Let us keep on considering that the surgeon introduces the infection.—Ed.]

A method would seem desirable which would relieve the patient of the long imprisonment in a plaster cast. Certainly, one can not place much confidence in steel plates because they lose their grip on the bone and in many cases become angulated. The beef-bone plates have some advantage over the steel plates since they do not act as an irritating foreign body to either the bone or the soft tissues and if proper immobilization by cast can be maintained they are much preferable to the steel plates. In large bones, especially the femur, we feel that they are unsafe because beef-bone of itself is not strong. For small bones they are satisfactory if some cortical form of bone splinting is required. They require proper equipment, such as drills and taps and the special bone-screws to fit the plates.

External Bone Clamps. Various types of clamps have been devised which work on the same principle as the plates, except that they are forced into the cortex by teeth and thereby have a clamping effect in more than one plane. As a matter of practice they are extremely unsatisfactory, since there are often many irregularities of the bone at the site of fracture and it is impossible to make the clamp fit properly. They are also of steel and are thus open to the same objections as the Lane plates.

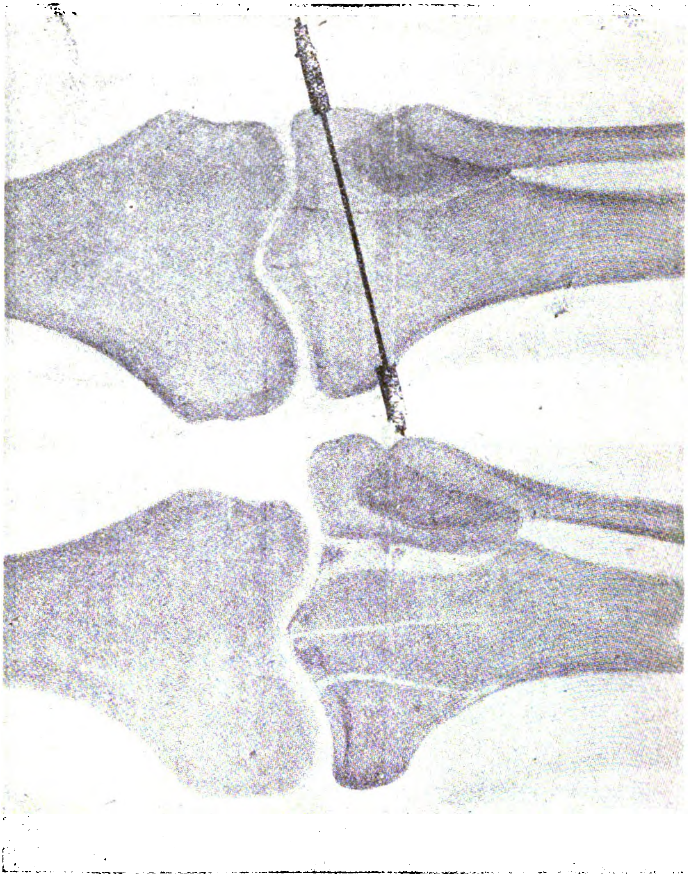
The Ivory Key. A key which fits snugly into a slot in a shaft or, as mechanics call it, a key-way, is the strongest form of mechanical union of shafts. The shaft forms a brace on all sides for the key which is driven into it. In consequence, this form of mechanical union is extremely strong and simple. It is necessary, of course, to have the proper mechanical equipment to fit a key into a key-way and, therefore, the method has not become so popular as the easier and less effectual

PLATE XI.



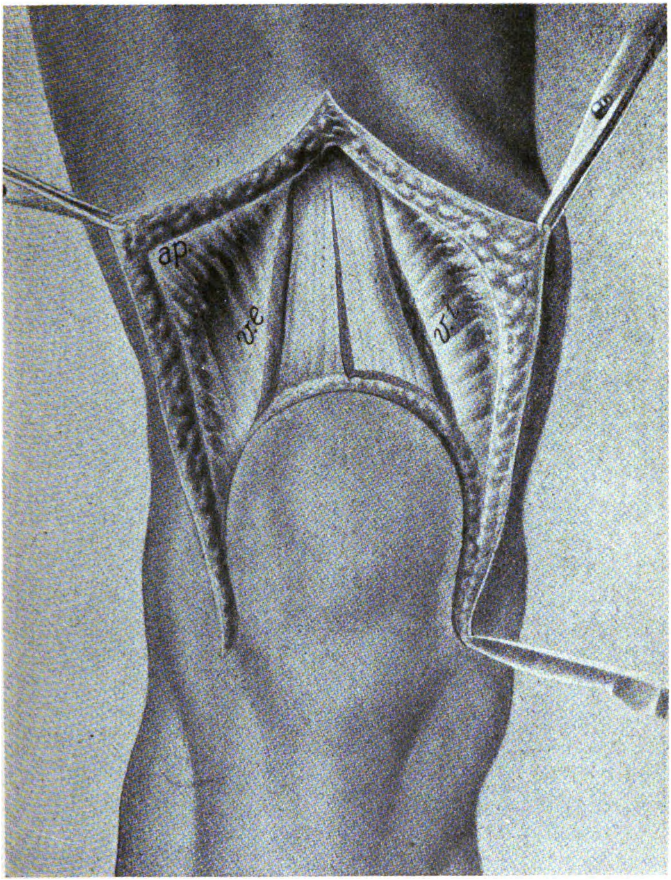
A. Parallel saw cuts through one side of the cortex of the bone.
B. Saw cuts connected by drill holes, leaving loose fragment of bone in center.
C. Fragment of bone removed, leaving slot, cut in through one side of the cortex, looking into the medullary cavity.
D. Ivory key in place in key-way with ivory nails driven through bone and key, holding key in key-way.
E. Transparent view at right angles to the above illustrations, showing lower edge of key resting against opposite cortex and held in place by ivory nails represented by dots, driven through at an angle to the plate.—Magnuson, page 271.

PLATE XII.



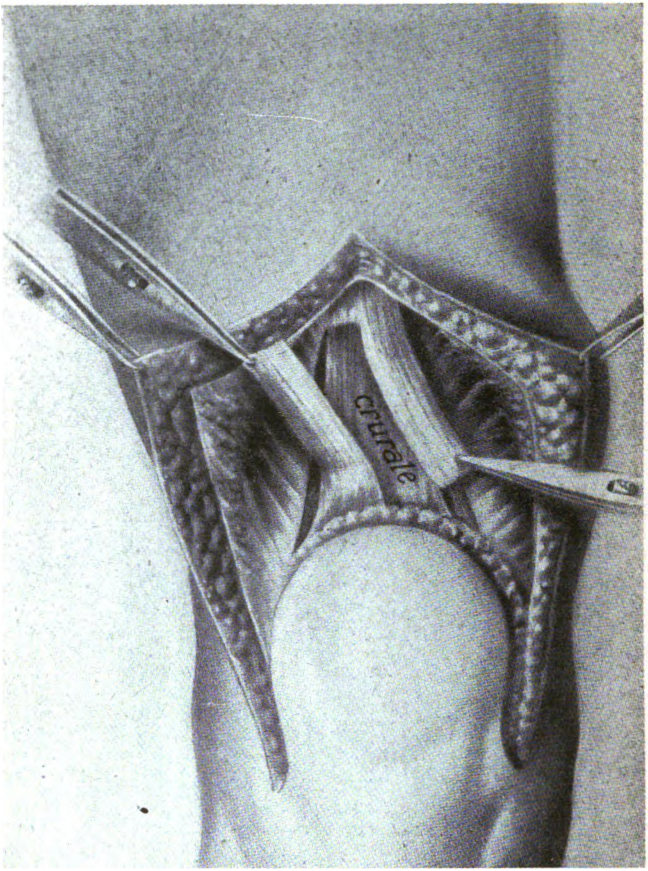
Illustrating case of Juvara, page 277.

PLATE XIII.



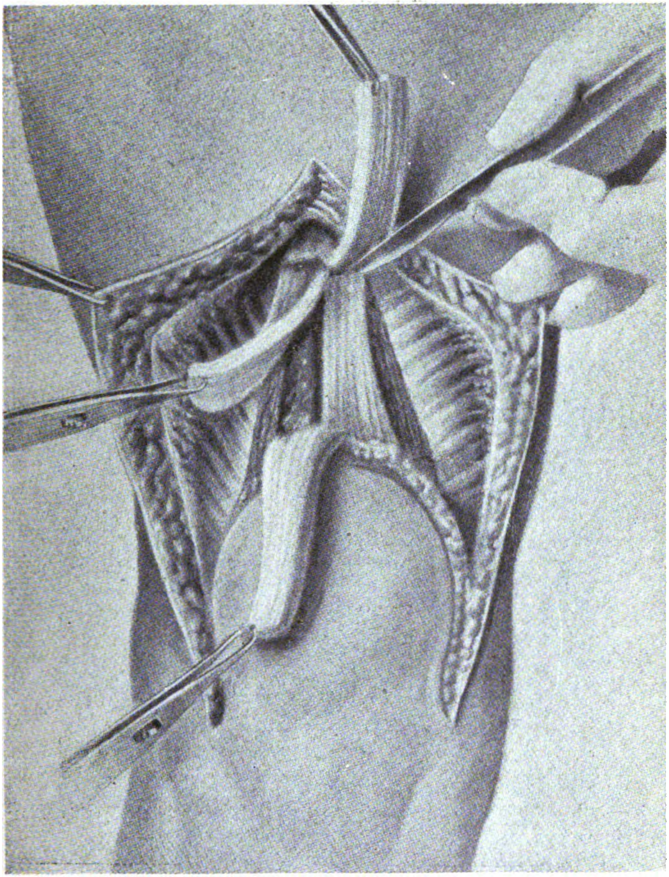
Isolation of the quadriceps tendon from insertions of the two vasti muscles. Z-incision of the superficial stratum of the quadriceps tendon.—Putti, page 281.

PLATE XIV.



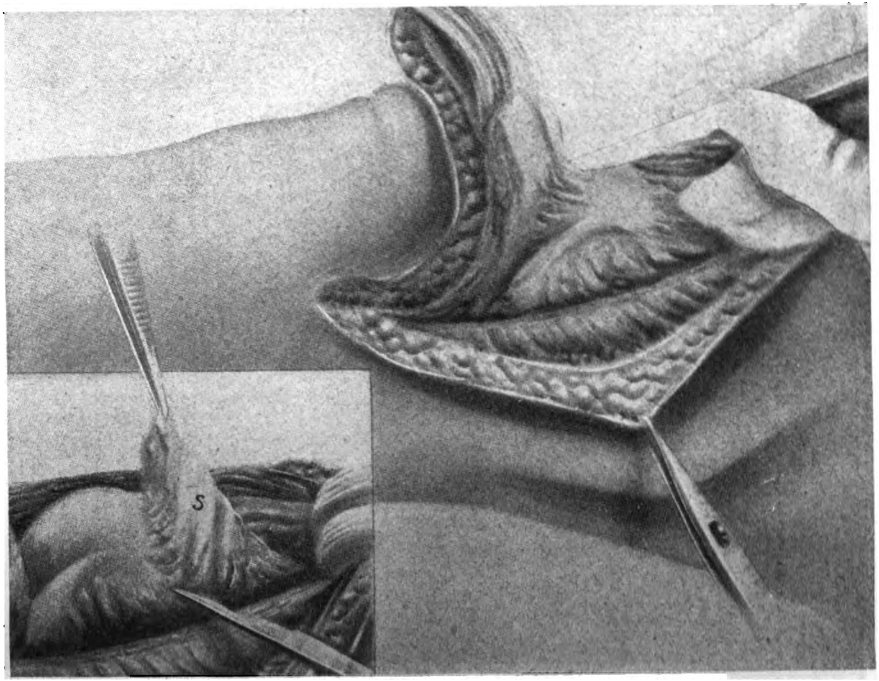
The superficial stratum of the tendon has already been incised.—Putti, page 281.

PLATE XV.



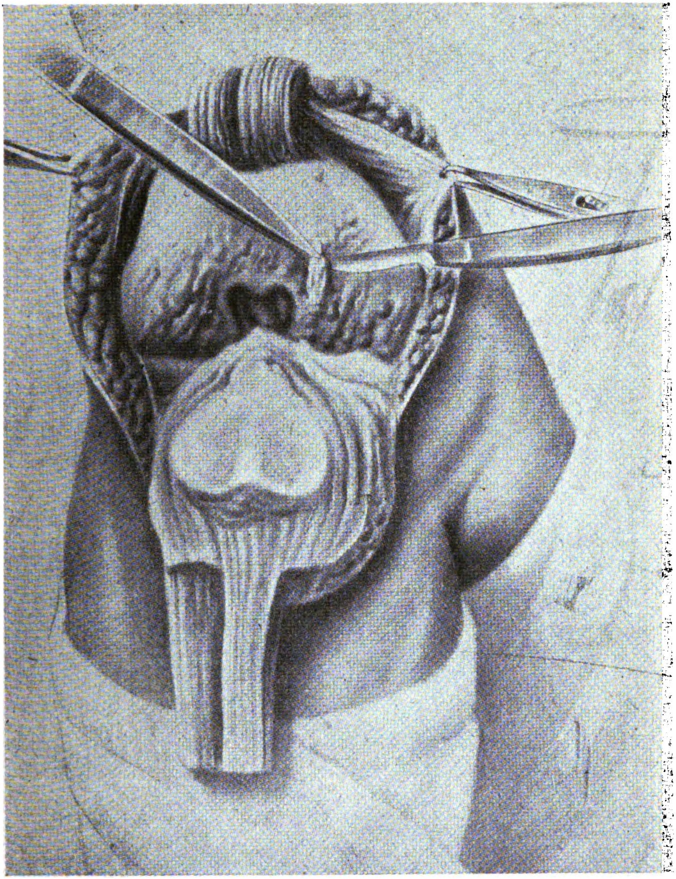
Z-incision of the crural tendon. Separate incision of the two tendon strata is superfluous in anthrotomies for ankylosis or in resection, but is requisite in joint reconstructions.—Putti, page 281.

PLATE XVI.



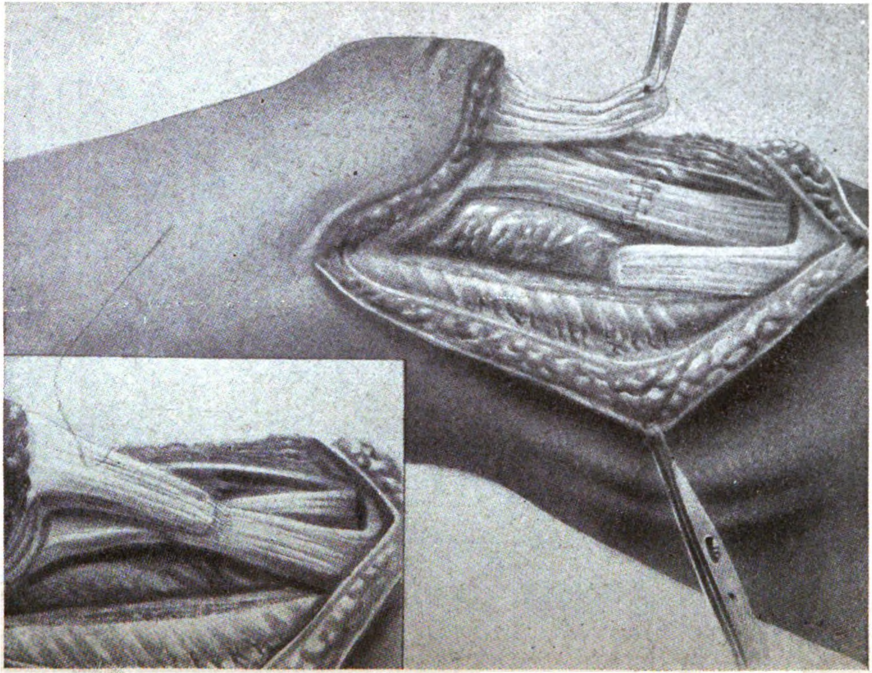
Detachment of the femoro-patellar synechia. The sub-figure shows details of removal of the synovial sac. -Putti, page 281.

PLATE XVII.



The knee flexed, with a complete view of the articular cavity.—Putti, page 281.

PLATE XVIII.



Reconstruction: Isolated suture of the two quadriceps tendon strata. The deep stratum is sutured in lesser tension than the upper.—Putti, page 281.

methods. The key is easy of application if the surgeon has a motor-driven bone set witn parallel circular saws, which are set at exactly the necessary distance to make a slot the thickness of the key to be used. The technique is as follows:

A slot 3/16 of an inch wide and 1¾ inches long, with its middle at the line of fracture, is cut in the bone with parallel circular saws. At each end of this cut a hole is drilled connecting the two saw cuts (Plate XI). The loosened fragment is then lifted out of the slot, leaving a key-way cut down into the medullary cavity of the bone. A thin chisel is then used to scrape away the contents of the medullary cavity immediately beneath this slot, so that the key may be driven firmly into the slot and the edge of the key may have a level base to rest against. When the lower edge of the key strikes the medullary side of the opposite cortex and is driven firmly against it, a hole is drilled through the bone and the plate on either side of the fracture, and an ivory peg or nail is driven through for the sole purpose of holding the plate into the slot and preventing motion in any plane. The pegs are cut off flush with the cortex of the bone and if the upper edge of the plate protrudes beyond the edge of the cortex, it is cut off flush with a small circular saw, so that the entire bone splint is now within the bone. The immediate union is so firm that the operator can safely reduce the amount of plaster, used for external fixation, to a minimum. In the humerus no fixation need be applied except the ivory plate after the stitches have been removed from the wound. In the radius and ulna a light anterior or posterior splint on the forearm, with the wrist and the elbow free, is sufficient and in the tibia and fibula the ankle need not be included unless the fracture is within three inches of the ankle-joint. In the femur a cast may be used from the pelvis to the knee, including the knee on both sides, but cut out in the back to allow flexion.

Oblique Fractures. In simple oblique fractures there is no excuse for using a plate of any kind. The Parham band is sometimes extremely useful, especially where there is comminution and it is necessary to bind a bundle of fairly large fragments together, and the author believes that this band and its tools should be included in the equipment of the surgeon who does fracture work. In simple oblique fractures, however, there is no method which is so simple, quick and sure as the use of a simple screw. Beef-bone screws are not strong enough for universal use. The ivory screw, which is made exactly like a machine screw with heavy V-shaped threads and a square head, so that it can be put in by a socket wrench instead of the screwdriver, is the very simplest form of mechanical union. A hole the size of the screw at the base of the threads is drilled at any angle to the plane of fracture. A mechanics' tap used for cutting threads is then run through and cuts the thread exactly the size and diameter of the screw to be used. The screw is then driven into this hole and holds the fragments firmly in apposition. One screw is usually sufficient, but two may be used in larger bones. There is no need for loosening muscle attachments or periosteum from the fractured fragments and the work is done from one side of the bone only, so that the circulation is not interfered with in any way and there is an extremely small amount of trauma. These plates and screws with the necessary instruments for their application are sold by surgical instrument dealers.

Methods of Applying and Retaining Bone Grafts. The ordinary use of kangaroo tendon run through drill holes at the edge of the slot is seriously deficient from a mechanical point of view. These inlay bone grafts constitute a key in a key-way and can be strongly fixed in the key-way by using an ivory or bone screw to fix the graft into the slot where a graft of sufficient size is used to allow the use of a screw. Instead of drilling many small holes along the edge of the slot, one hole is drilled near each end of the graft into the cortex on the opposite side. Threads are cut in this with the mechanics' tap and the ivory screw is driven through the graft and into the solid bone. This holds the fragments firmly together and the graft firmly into the slot, allowing no motion in any angle. It is much simpler and quicker than the kangaroo tendon method.

Overlay Bone Graft. Ununited fractures of small bones, especially the radius and ulna, often do not permit the use of any considerable size graft applied by the inlay method and the author has used with considerable success the overlay graft. About one-third of the diameter of the bone on the side nearest the operator and for a distance of 1½ to two inches above and below the fracture is removed with a circular saw. This leaves a flat side upon which can be laid a piece cut from the tibia. The flat side of the tibial graft should be laid on the flat cut surface of the fractured bone, and fixed by ivory screws driven through each side of the fracture.

Intramedullary Bone Graft. This has almost been discarded because the medullary cavity must be reamed out so much that the bone graft does not hold the fragments in line with sufficient solidity to insure perfect alignment. It is also easily broken.

Combination Inlay and Intramedullary Graft. In large bones, such as the femur and tibia, this combination can be used. It is done by cutting a short graft from the fractured end of the most convenient fragment. This graft is cut in the shape of an extremely long-sided, truncated cone. The end of the graft which formed a part of the fractured surface is exactly the width of the medullary cavity and the end farthest from the fracture not over ⅛ of an inch wider than the medullary cavity. The graft is from 1½ to 2 inches long and covered by periosteum. The sides of the graft being cut out with the circular saw, the end of the graft is freed with a thin-bladed chisel. The opposite fragment is then angulated sideways out of the wound and the graft driven in to the end of the medullary cavity to half its length. On account of its wedge-shape it fits snugly. The fragment is then brought back into line with its fellow and the protruding end of the graft is driven down into the slot out of which it came. This being the wider end allows for the thickness of the saw blade on each side and yet allows the graft to come closely in contact with the walls of the cortex on each side, and sink down into the medullary cavity. The result now is that one end of the graft is driven firmly into the end of the medullary cavity of one fragment, the other end being driven into the lower end of the slot out of which it came. There is no way of angulating these fragments except by one end of the graft slipping out of the slot or key-way. This is provided against by drilling through the graft and the opposite cortex, tapping a thread in the bone and putting through an ivory screw which holds the key firmly down in the key-way. This operation has been extremely satisfactory in the hands of the author and other surgeons who have seen fit to use it.

[Magnuson deserves much credit for developing and perfecting the use of ivory screws and keys. The method is simple and strong. He believes that the ivory is readily and quickly absorbed and in one case has noted the disappearance of an ivory screw in six weeks. A year ago the editor removed two ivory intramedullary pegs, about ¼ inch in diameter and 2 inches long, from the radius and ulna of a woman of 50 who had been operated upon nine years before. The radius had become firmly united but the ulna was the site of non-union which had persisted through all of these years. The radius and ulna were shortened and overlapped after removing the ivory pegs and a rapid and satisfactory union of both bones took place. The pegs showed remarkably little erosion and were as strong, apparently, as when they were applied. In view of this finding it is difficult for the editor to understand why Magnuson's plates and screws become absorbed so much more rapidly, but possibly the age of this patient had some bearing upon the rate of absorption. After all, it is by no means essential that these plates and screws should ever become absorbed except that when they are placed in dense cortical bone, it would seem advantageous to have the ivory replaced by normal bone cells. It seems to the editor that Magnuson's methods should be adopted as a part of the standard technique in the operative treatment of fractures.—Ed.]

Treatment of Oblique Fractures. P. F. Nigst[8] treated sixteen oblique fractures (thirteen in males, three in females) in patients varying in age from 10 to 67 years, with severe grade of disalignment of the fragments, and treated by the oblique nailing method of Arnd. The fibula was generally fractured.

Nailing was done in from two to twenty-nine days

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(8) Schweiz. med. Wochenschr., Jan. 27, 1921.

after the accident and the nail was generally removed about fourteen days after operation. The method is indicated in all young oblique and spiral fractures of the leg in which the fragments cannot be reduced and maintained by bloodless methods.

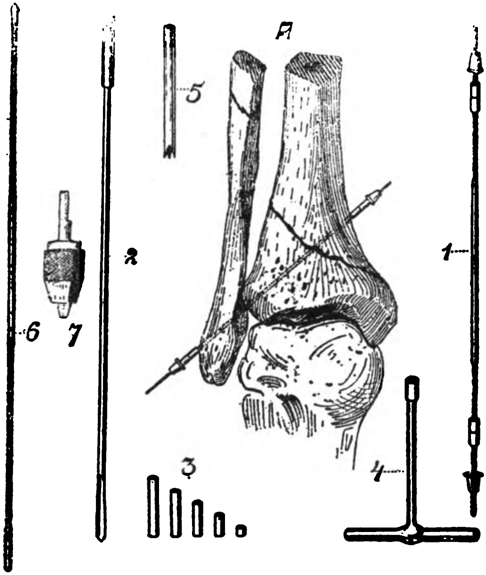

Fig. 35.—1, complete rod; 2, drill; 3, additional pieces; 4, key; 5, guide; 6, fileted stem; 7, universal mandril for drill. A. Rod in position for an oblique fracture of the inferior extremity of the tibia.

Six results are perfect anatomically and functionally; five show shortening of from 1 to 3 cm.; eleven cases show a slight muscle-atrophy.

A sequestrum was observed in only one case.

The cases have been followed from two to five years and even longer.

Osteosynthesis in Fractures of Certain Epiphyses. Juvara's[9] method of osteosynthesis can only be applied advantageously in fractures of certain epiphyses favorably situated and near the skin, viz., the inferior extrem-

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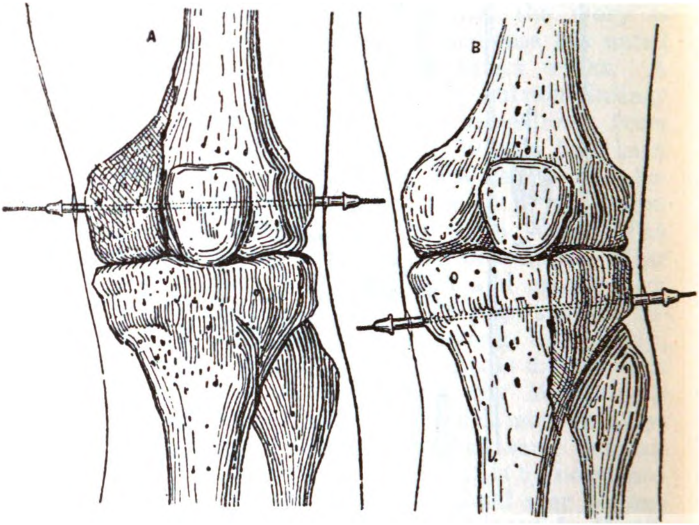
(9) Presse méd., Sept. 1, 1921.

ity of the femur, the superior and inferior extremities of the tibia, and the inferior extremity of the humerus.

The method consists essentially in a long thin steel stem which is passed through a passage drilled through the bone fragments when they are properly reduced. There are screwed ends, and by a key, additional pieces, and a guide, the two fragments can be very closely approximated and held rigidly in place until consolidation, when the end screws are loosened and the steel rod withdrawn (Figs. 35 and 36).



A. B.

Fig. 36.—A. The rod placed in a case of fracture of the internal condyle of the femur. B. Of the condyle of the tibia.

Antero-posterior fractures of the femoral and tibial condyles are best suited to this method of osteosynthesis. In several cases in which it has been tried, very rapid and perfect recoveries followed. One case is detailed, a bicondylian tibial fracture (Plate XII).

Injection of Phosphate in Fractures. R. J. Behan[1] records some experimental work to show that triple cal-

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(1) Med. Record, April 16, 1921.

cium phosphate supplied directly to the bone by injecting it through needles with a syringe in cases in which a fracture is not uniting rapidly or in other cases of delayed union has a stimulating effect upon the regenerative powers of bone. The calcium supplied must be brought into association with the bone itself.

Ununited Fractures. Where atrophy of disuse is already developed, no matter how the case is handled, whether with a bone transplant, open operation, or any other technique, the result, A. D. Bevan[2] says, is always uncertain, as it must depend on good wound repair in the bone and then overcoming the atrophy of disuse in the limb. In open operations the simplest techniques give the best results, but as a last resort in some of these cases of non-union, a definite free transplant of bone will give the best result. But even in this the atrophy of disuse must be overcome.

Bevan thinks that the matter of rigid immobilization at the point of fracture may be carried to excess. He does not fear a little motion at the point of fracture.

In repairing old ununited fractures of the femur, Bevan favors mortising the fragments and leaving little or no foreign material in the thigh.

Bevan thinks that open operations have been greatly overdone in this country. The records of the Cook County Hospital, Chicago, show 52 per cent. of bad results and infections following bone plating. When a fairly good approximation can be obtained with mechanical appliances without open operation, the case should be treated in that way.

Open Treatment of Fractures. J. F. Smith and M. L. Jones[3] treat only those fractures by the open method in which in their opinion it is impossible to secure and maintain satisfactory approximation by the older means. They have treated ninety-seven fractures by the open method. These include twenty-six of the femur, fourteen of tibia, twelve of tibia and fibula, eleven of humerus, six of patella, the balance being of other bones.

A Lane plate was used thirty-nine times; silver wire, thirty-three; intramedullary graft, two; sliding bone

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(2) Railway Surg. Jour., 1921, vol. 27.
(3) Ill. Med. Jour., May, 1921.

graft, four; bone screws or pegs, five; steel nails or screws, six; other methods, fourteen.

Infection occurred in fourteen cases, failure of or delayed union in three; in two cases the limb had to be amputated. Bone graft was lost by infection in one case.

These authors consider that the preservation of the periosteum is very important in open operations, especially on the long bones, and that in no case should it be stripped or scraped in applying the fixation device.

Bone Grafts. S. Alwyn Smith[4] notes that fractures of bone grafts have occurred frequently. He concludes that it is now generally accepted that an autogenous graft implanted into a bony gap, in the main, dies and is absorbed and replaced by osteoblasts derived to a certain extent from its own surface, but principally from the endosteum of the host bone at either end. As a rule the process of absorption out-distances regeneration and as a consequence the graft becomes soft and porous at either end, particularly around each extremity of host bone. This occurs about the sixth week. If stress or strain on the graft is allowed, the first and commonest type of graft fracture occurs, which we may call a disintegration fracture. It is more apt to occur if a graft of soft cancellous bone has been used. The use of ribs as grafts to fill a gap is almost certain to fail and for the same reason slide inlays of bone which is atrophic due to disuse are not advisable if harder bone from elsewhere is available. If a fracture of a graft takes place, union may occur in the presence of strict immobilization, but if movement of the parts is permitted, disintegration of the graft goes on. Should a graft survive the first three or four months without disintegration, we may regard the case as successful, although fractures after this time may occur. This type of fracture generally occurs near the center of the graft and is usually transverse. Apparently they will unite, but only after a prolonged period. Disintegration of grafts is less common nowadays than formerly, and this may be attributed to the present use of much thicker grafts than was formerly the custom. The bone graft should be bulky and its consistency should vary with the

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(4) Jour. Orthop. Surg., June, 1921.

length of the gap. The bigger the defect, the more compact should be the graft substance.

Arthroplasty. In an article on arthroplasty of the jaw, J. M. Neff[5] says that ankylosis of the jaw and the elbow-joint are, with an occasional exception, the only two indications for arthroplasty. In the knee and hip we occasionally see successful arthroplasties, but the failures greatly outnumber the successes. A painless bony ankylosis of the knee in extension is very much better than a painful arthroplastic knee, even though the motion be quite normal and extensive. The same applies to the hip, provided, of course, the ankylosis is not bilateral.

Arthroplasty on the shoulder is contraindicated, because the scapula will follow the humerus in all of its useful and necessary movements, provided that it is ankylosed in good position. The operation on the wrist and ankle is never indicated.

In performing the operation upon the jaw, Neff considers it unnecessary to interpose a flap of soft tissue or any prepared membrane, since the soft tissues will fall into place in the intervening space, producing a fibrous ankylosis.

W. P. Carr[6] agrees with this conclusion.

Arthrotomy. In the course of an arthrotomy the articular reconstruction ought to be thought of as much as possible and V. Putti,[7] therefore, thinks that the method selected should provide: (1) a complete exposure of the articular cavity; (2) sufficient space to realize an exact and complete modelling of the surfaces of the nearthrosis; (3) an absolute respect of all the functional elements of the nearthrosis (muscles, nerves, etc.); (4) anatomic restoration of the joint as perfectly as possible, so as to assure early correct functioning.

Putti recommends a method which has given him excellent results and which he describes and illustrates with excellent figures (Plates XIII to XVIII). The method includes:

First Stage: Reversed U-incision, circumscribing the

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(5) Surg. Gynec. and Obstet., July, 1921.
(6) Ann. Surg., March, 1921.
(7) Chirug. d. organi di mov. Bologna., February, 1921.

patella, comprising skin, cellular tissues and superficial aponeurosis.

Second Stage: Isolation of the extensor structures.

Third Stage: Plastic tenotomy of the quadriceps tendon.

"Dedoubling" of this tendon may be done on either the frontal or sagittal plane for all the thickness of the tendon or separately for each of its two strata. Tenotomy in the sagittal plane is preferable because it gives thicker and more resistant strips.

When the tenotomy is done to obtain rigidity of the knee, it is better to make it on each stratum separately as there may be a different degree of retraction in each. A Z-tenotomy of the crural tendon is made, the vertical branch being more or less long according to the elongation desired.

Fourth Stage: The patellar strip is turned back. If femoro-patellar or femoro-tibial adhesions exist they are destroyed. The knee is gradually flexed until there is a clear view of the articular cavity and sufficient space to execute the different steps of arthroplasty.

Fifth Stage: Hemostasis.

Sixth Stage: Restoration. The two or four (as the case may be) quadriceps tendon strips are sutured under suitable tension with silk or catgut and the muscle parts sutured to the reconstructed tendons. Suture of aponeurosis.

Putti has used this method in four cases of resection of the knee for tuberculous osteo-arthritis, in addition to arthroplastic operations.

Insufflation of Air into Joints. J. Terracol and L. J. Colaneri[8] refer to the insufflation of joint cavities with atmospheric air and their subsequent examination by *x*-rays. Air is preferable, they believe, to oxygen gas. The fluid in the joint is first aspirated and joints which are infected are not subjected to this mode of examination. In the knee-joint the air injection is made at the upper external angle of the patella. After insufflation,

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(8) Presse méd., Feb. 9, 1921.

the *x*-ray shows the bone surfaces in sharp relief, the ligaments, menisci, etc., being discerned quite clearly, according to the position in which the patient is placed. At the articular interline the injected air acts like a fluid tending to separate the bone surfaces. While the method is now of diagnostic value only in the examination of various joints, it is possible that in the future it may have a therapeutic application. Pneumoserosa facilitates the study and differential diagnosis of the meniscal syndrome and especially the rather frequent lesion of disinsertion of the meniscus from the capsule.

TUBERCULOSIS OF BONE

Tuberculosis of Bone. Nathaniel Allison[9] has made a study of the material collected during the treatment of fifty cases of bone tuberculosis. He thinks it unnecessary and incorrect to attempt to differentiate different types of tuberculosis lesions according to former classifications. He agrees with Nichols that in all cases of tuberculous involvement of the joints a primary bone focus has been responsible. No evidence has been found of the existence of pure synovial tuberculosis.

The clinical characteristics of the picture of skeletal tuberculosis are the onset, indicating bone involvement, and the gradual extension, indicating joint involvement. The nature of the tissue in its reaction to infection determines the anatomic-pathologic condition which results. Bone tuberculosis has its origin, in most instances, in the cancellous bone, and its extension to the neighboring tissues with their individual characteristics of reaction to infection explains the various types of the disease. In those tissues where the reaction to infection is that of proliferation or hypertrophy of bone, an hypertrophic lesion will be the result. This is usually observed only in the diaphyses of bone. In the joints and the epiphyses the usual reaction is degenerative and destructive. The importance of this observation is evident, since it has been customary in the past to consider bone and joint tuberculosis always as a destructive and not as a proliferative

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(9) Archiv. Surg., May, 1921.

process. It is cumbersome, confusing and, in a sense, wrong to describe the process of tuberculosis separately, as it affects bone tissue of various types and joint structures. It is all one and the same. The variations are due only to the characteristics of the tissue affected.

It is also unwarranted, he says, to classify this disease as to the type of reaction observed. Allison believes that search will reveal most types of tuberculous process in practically any well-established lesion. He means by this, that he is opposed to the terms employed in the older literature as classifications, such as infiltrating, atrophic, caseous and hypertrophic tuberculosis of the bone. This is especially true of such descriptive terms as "chronic synovial tuberculosis," "fungating or granulating tuberculous synovitis." Here the observer has described one phase of a tissue reaction as a pathologic and clinical entity.

Allison thinks that this disease may occur more frequently than is generally believed in the regions of the skeleton away from the joints, and that this fact should be emphasized in the teaching of the characteristics of this disease.

Osseous and Articular Tuberculosis. According to E. Sorrel,[1] this is the expression of a general rather than of a local disease, but age to some extent governs the localization. In children from 2 to 5 years the bones are often attacked, especially the smaller bones; older children from 5 to 15 years more frequently show a single lesion—coxalgia or Pott's disease.

Every osteo-articular lesion passes through a destructive and a reparatory phase which can be followed radiographically. In the first phase the contours of the epiphyses are softened and the diaphyses dystrophied by resorption of compact tissue. In the second phase, when the tuberculosis is old, there is deformation in the vicinity of the bone extremities, but the diaphyses preserve a normal aspect. Evolution is slow. The period of activity of a coxalgia or Pott's disease is about 2½ years and the period of repair about as long.

In the beginning, the symptoms are pain, contraction, and limitation of articular movements, swelling, local

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(1) Presse méd., Jan. 5, 1921.

temperature and corresponding adenitis. According as the articular repair proceeds the joint ankyloses, this being usually fibrous. In some cases cold abscess follows, which may open to the exterior and become infected, completely changing the clinical picture.

While the tendency has been to class all chronic osteoarthritides as tuberculous, we know that many cases are due to syphilis, mycoses and other non-tuberculous processes. Laboratory tests will usually clear up the nature; besides this there are the tuberculin and other tests.

No method at our disposal has the power of arresting tuberculosis.

Diagnosis and Treatment of Tuberculous Osteo-Arthritis. E. Sorrel's[2] advice regarding the treatment of osteo-articular tuberculosis may be summed up in a few words, *i.e.*:

In the case of a child, immobilize;
In the case of an adult, resect;
In the case of an old person, amputate.

Resection and amputation in adults and the aged are only the confession of our powerlessness against the march of the disease. In the child conservative treatment is more efficacious. Although we can do nothing to arrest the course of the tuberculosis we can *lead* it, and by a judicious orthopedic treatment we can diminish the extent of the lesions so that the child may recover and show the minimum of incapacity. That is, by good hygiene, etc., we can put the organism in the best condition to fight the ravages of tuberculosis.

Treatment of Tuberculous Osteo-Arthritis. C. Lenormant[3] disagrees with the formulas enunciated by Sorrel, *viz.*: in osteo-articular tuberculosis in the child—immobilize, in the adult resect, and in the aged amputate. Resection in the adult is an admirable procedure, but it has its strict indications and every case in the adult does not call for resection. Amputation in all patients over 50 years old is too radical a formula. Resection is successful in many of these cases, with a resulting perfect consolidation. The age of the patient with osteo-articular tuberculosis is certainly an important factor which

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(2) Presse méd., Feb. 5, 1921.
(3) Ibid., March 19, 1921.

must be considered by the surgeon, but it is only one factor; localization, degree of involvement, presence of fistulae, etc., must always be considered in deciding upon the method of treatment.

MISCELLANEOUS CONDITIONS

Fragilitas Ossium. H. P. Wright[4] discusses this subject. Osteogenesis imperfecta is a rare systemic disease of unknown origin, characterized by imperfect development of bone. Clinically, it is manifested by multiple spontaneous fractures and it occurs in two forms, the congenital and the late. A better name is fragilitas ossium. The author does not advance any endocrine theory.

Some of the fractures occur during intra-uterine life. The distribution of cases is not haphazard but generally runs in families. All the bones of the body are either soft or brittle. There is a marked preponderance of medullary substance over spongiosa, and the lamellar process of the bone is less marked. The bone marrow is mostly fibrous, and osteoblasts are markedly diminished in number. A peculiar condition sometimes associated is that of otosclerosis and blue sclerotics. Chaussier has reported a case with 113 fractures.

The metabolism has been worked out in several cases. Calcium content is slightly low, although retention of calcium is good.

The condition must be distinguished from rickets and syphilis and this is easily accomplished by the Wassermann test and *x*-rays. Certain cases go on to spontaneous cure and the older the child is when the first fracture occurs, the more hopeful is the prognosis.

Thyroid, parathyroid, pituitary, thymus, pineal gland, and adrenal have been tried separately and in combination without noticeable success. Fresh air, good food and cod-liver oil are indicated in all cases. Phosphorus may be combined with the cod-liver oil. Calcium has been given but its effect appears to be purely temporary. Two cases are reported, in brothers; a third child, a sister, showed no indication of the condition.

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(4) Canadian Med. Ass'n., Jour., June, 1921.

Osteo-Arthropathy of Pierre Marie. L. Rénon and E. Gèraudel[5] discuss the hypertrophying osteo-arthropathy of Pierre Marie, the clinical history of a case of which is given in detail with several illustrations. The principal characteristic of this disease is an osseous neoformation at the expense of the external layers of the diaphyses, especially of the long bones, the epiphyses and the articular surfaces being respected. An exact diagnosis can be made early by radiologic examination. Deformations of the fingers are not essential symptoms of the affection and these are sometimes only slightly manifested. The deformations do not belong to this nosologic entity. There is a pathologic connection between this disease and the lung lesions. The authors think that the name "ensheathing osteitis of the diaphyses" characterizes the disease in an exact and sufficient manner.

The case studied was that of a man aged 66 years, and the findings were made at autopsy. The case was one of generalized osteopathy involving all the limbs, characterized by an osseous neoformation ensheathing the primary skeleton, but particularly developed in the diaphyses. The osseous affection occurred in from six to seven months in the course of a chronic pneumonia complicated by lung cancer. There were also signs of hypophysary hyperactivity, adenomatous lesions of the suprarenals, chronic disseminated nephritis and elastic hyperplasia of the arteries.

Cinematization of Forearm. P. F. Scheel's[6] article is a study of cinematization of the forearm. Each muscle is measured with regard to its length and thickness and as regards its force of traction. Scheel recommends covering stumps not sufficiently protected with cutaneous strips taken from the thoracic region. The muscle tunnels should be formed as part of the cinematization prosthetics; if they cannot be sufficiently covered by skin taken from the vicinity, they can often be so clothed by autoplastic strips removed at a distance. The greater part of the article contains details of technique for removing such strips from the thoracic and abdominal region, the Italian method of grafting being employed.

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(5) Presse méd., June 23, 1920.
(6) Zeitschr. f. Orthop. Chir., 1920, vol. 60, p. 421.

Orthopedic Treatment of Anterior Poliomyelitis. H. A. T. Fairbank[7] discusses this subject. He advises the standard methods now in use in this country for the early stages—rest with fixation to prevent deformity, the rest being complete until all pain and tenderness have absolutely disappeared. Care should be taken to prevent spinal curvatures and the patient should be very gradually allowed to sit erect. In the second stage, muscle training, warmth, massage and adequate support by splints, used both day and night, form the proper routine. Deformities which have existed prior to the beginning of treatment must be overcome by tenotomies, wrenching, etc., during the second stage. When at the end of a year paralyzed muscles have not recovered after careful treatment, it is probable that no further improvement will take place. Muscles which have made some improvement in the first year may be capable of some further recovery. After two years of earnest treatment operations may be considered for the relief or improvement of function in muscles which are completely or partially paralyzed. Care must be taken to select for transference only muscles which are sufficiently powerful to do the work. Tendons should always be attached subperiosteally or in a tunnel in the bone rather than simply sewed to another tendon. Where possible it is advisable to use muscles which have a normal pull in the same plane as that of the paralyzed muscles. Fairbank has not yet seen a transplanted biceps which has been inserted into the patella produce extension at the knee-joint by contracting alone at the will of the patient. He has seen it contract with the flexors and interfere with the action of the flexors, but he has not seen it produce extension of the knee-joint at the will of the patient.

[The Editor has seen not one but many cases in which the biceps, assisted preferably by the transplanted semitendinosus, produces excellent and powerful extension of the knee at the will of the patient. Wherever possible, it is wise to transplant these two muscles around opposite sides of the knee instead of simply using the biceps. This operation is often improperly performed, the two flexor tendons not being freed upward a sufficient distance

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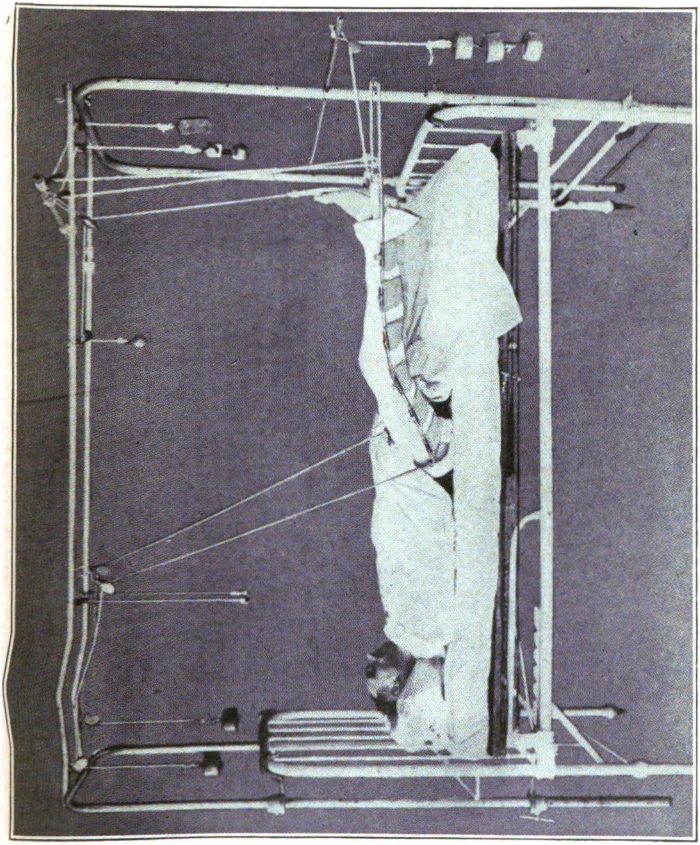
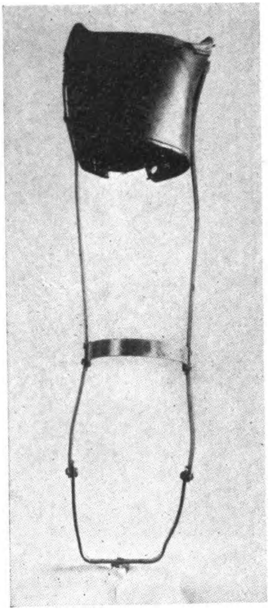
(7) Brit. Med. Jour., April 9, 1921.

PLATE XIX.



Photograph showing frame in use.—Allison, page 292.

PLATE XX.



Carruthers, page 294.

upon the femur, and the short head of the biceps being left attached to the biceps tendon instead of being stripped off and left in its original situation.—Ed.]

A satisfactory transplantation in the lower leg is that of the extensor proprius hallucis into the head of the first metatarsal. Transplantations in the upper limb are less commonly performed. Fairbank places his transplanted tendons under much greater strain at operation than he formerly did, and is convinced that the results are thereby improved. No strain should be placed upon the grafted muscles for several months after the operation. Arthrodesis for infantile paralysis is not recommended at the hip-joint. In the ankle some cases give good results. If the mid-tarsal joint and the subastragaloid joint are also fixed the results are much improved. Whitman's operation of astragalectomy and backward displacement of the foot is highly recommended. Silk ligaments and tendon fixation are considered of doubtful efficacy.

Paralytic Scoliosis. Forcible correction and the use of celluloid jackets will be found satisfactory. It is possible that the bone graft and other methods of bone fusion may be more frequently performed for paralytic scoliosis than they have been in the past.

Stoffel's Operation for Spastic Paralysis with Report of Thirty-two Cases. Gill[8] did his first Stoffel operation in 1914. Since that time he has done this operation —partial neurectomy—on thirty-two patients with a total of seventy-two operations.

In all cases of spastic paralysis there is an apparent contraction of the muscles—the stronger groups overcoming the weaker and producing various degrees of deformities. The tendency among orthopedic surgeons has frequently been to consider these backward children as more or less hopeless; but certainly if no orthopedic measures are employed these cases will not improve of themselves. Many cases can be very greatly helped, and some improvement can be secured in almost all.

The object of all treatment is to secure restoration or improvement of function. The non-operative treatment should aim at improving function as far as possible be-

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(8) Jour. Orthop. Surg., February, 1921.

fore surgical operation is resorted to. This course will also enable the surgeon better to decide what operation, if any, may be required. It must be borne in mind that in spastic paralysis the element of spasticity far over shadows the element of paralysis. A real or complete paralysis is very rarely present. Our object in treatment, in all methods of treatment including the Stoffel operation, is simply to secure better balance, so that the weaker muscle groups may not be overcome by more powerful antagonists, but may be able to exercise their proper function. The operation is but the beginning of the treatment, for a long and careful course of active exercises must be carried out.

The operation consists in the excision of a portion of the nerve supply to the strong and contracted muscles. The aim of the operation is to remove the deformity and, as well, to break the vicious circle of the peripheral arc, which produces the deformity. When this has been accomplished it is found that the brain in most cases is able to exercise more or less control over the peripheral arc. For the purpose of making clear the author's technique his operation on the upper extremity will be described in his own language.

He has not found it necessary to operate for flexion contracture at the elbow, but it is possible in certain cases that a portion of the nerve supply to the biceps muscle might require resection. The median nerve is exposed at the bend of the elbow. The incision need not be more than two inches in length. The nerve is freed from surrounding tissue, and partially retracted out of the wound, and supported on a grooved director or a hemostat, placed transversely. On the anterior aspect of the median nerve adjacent to the biceps muscle is to be seen a nerve tract or cord. A portion of this separates itself from the median nerve and goes directly to the superficial head of the pronator radii teres. This is the first branch to leave the median nerve in the flexure of the elbow. This branch should be entirely resected for a distance of several inches. It can be cut off below near the joint where it enters the muscle, and can be dissected up from the median nerve any desired distance. The remainder of the tract consists of the nerves to the flexor carpi radialis, the palmaris longus, and the deep head of the pronator radii teres. These bundles of nerves are to be freed from the remainder of the median nerve and from one another and to be tested by the electrode. In severe cases of pronation and flexion contracture all of these nerves should be excised. In less severe contracture one may split the nerve to each muscle and may resect approximately one-half to three-fourths of it. The nerve to the pronator quadratus is to be found in the dorsal portion of the median nerve. Usually it should be left intact but in very severe cases it may be resected. In none of his cases has he found this resection necessary. The median nerve is now further separated into its constituent bundles. It will be found that the nerve supply to the flexors of the fingers is on the dorsal and ulnar aspect. These bundles should be freed from the remainder of the median nerve, separated from each other and tested by the electric current. Such portions of them may be removed as is demanded by the severity of the contracture. The remainder of the median nerve consists of the sensory tracts and of the motor nerves for certain intrinsic muscles of the hand. It is thus found that the median nerve consists of a definite number of nerve bundles or funiculi, which like cables are bound together. The tracts to the various muscles always occupy the same relative position in the nerve; in other words, the nerve has a definite topography or internal structure which is always the same. The surgeon will soon learn by observation the position of these various bundles, and may in time learn to dispense with the use of electrodes; but in his earlier cases it is advised that he test always each bundle after it has been isolated to determine which muscle it supplies. One may use the ordinary brain electrode, or one may have a special electrode for this purpose. It will be found that very slight stimulation is necessary to secure response in the muscle. If a strong current, there is danger of its spreading from one bundle to another, thereby confusing the surgeon as to which bundle of nerves he has isolated. The least strength of current necessary to produce muscular contraction should be employed. It is found that these spastic muscles respond to slighter stimulation than do normal ones. The surgeon has now produced a certain amount of paralysis of the muscles of pronation and of the flexors of the wrist and fingers. He has left, of course, untouched, the ulnar nerve, which also supplies a portion of the flexors of wrist and fingers. It may be attacked in a similar manner at a later operation if necessary. The same general method will apply to operations on the lower extremity.

Not all cases of spastic paralysis are suitable for operation. Those are the most suitable which have a fixed deformity due to contracture of one or more of the muscle groups, whether they be due to a cerebral or to a spinal lesion.

The operation is contraindicated in the most severe phases of Little's disease with diffused spasm in almost the entire body and in progressive multiple sclerosis, and those extreme cases of idiocy in which the patient would never be able to walk, even if the deformities were corrected and the spasticity reduced. During the after-treatment the patient may require no apparatus, but it should be used if needed. In the upper extremity it will usually be found better to apply a light cast immediately after the operation, with the forearm and hand in a position of overcorrection. Afterward, the wrist and fingers should be kept on a splint in a hyperextended position for three or four months. The hand should be taken from the splint frequently during the day for treatment and exercise. Over-fatigue of any of these patients should be avoided. They are encouraged to make active movement, yet it must not be overdone.

The author believes that the Stoffel procedure is the best single operation which has been proposed, because it is applicable to a greater number of cases, the results obtained are more uniformly successful, the operation itself is in no way a severe one, and no ill results appear to follow it. However, it is not a panacea for spastic paralysis nor is it indicated in all cases.

NEW APPARATUS

An Adjustable Extension and Suspension "Balkan" Frame. The appliance here described by Nathaniel Allison[9] is not new in any of its principles. It repre-

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(9) Surg. Gynec. and Obstet., May, 1921.

sents a device used with unusual success during the war in our military hospitals. The details are clear from the illustrations (Fig. 37 and Plate XIX). It is made of ordinary $1\frac{1}{16}$-inch tubing and can be adjusted to any type of hospital bed, 2 feet 6 inches in width and 6 feet 6 inches in length.

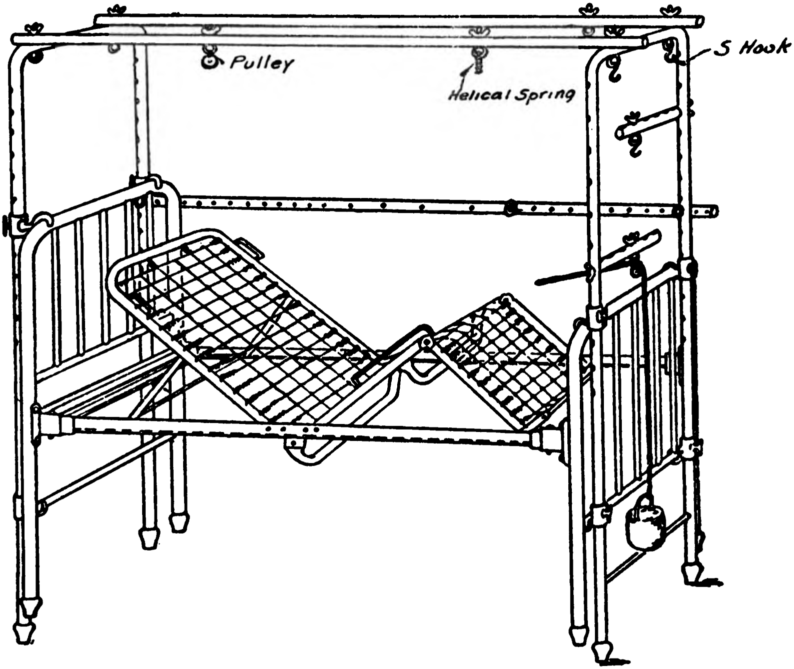

Fig. 37.—Adjustable extension and suspension frame for treatment of fractures and joint injuries. Height of frame 6 feet 6 inches from floor, 2 feet 6 inches wide. Made of $1\frac{1}{16}$-inch tubing, with rubber covered adjustable malleable iron hooks and wood plugs, two long top bars, one long side bar, two short foot bars drilled so that any sort of adjustment can be made.

It is described for the following reasons:

To emphasize the value of the suspension treatment of fractures and joint injuries in our civil hospitals;

To interest others in having available in our hospitals for immediate use a frame made of tubes or tubing which will not present the disorderly appearance of the wooden

Balkan frame which is used at the present time in our civil hospital wards.

The frame possesses greater rigidity than the wooden frame.

It is not expensive, and adjustment is more easily and perfectly carried out.

Leg Brace. F. W. Carruthers describes a brace consisting of two steel uprights with a caliper foot piece. A leather socket for the upper part of the leg just below the knee is made over a plaster mold and fits very accurately (Plate XX). This brace is suitable for such conditions as Pott's fracture and other fractures and deformities of the lower limb, in the treatment of which it may be desirable to have the patient able to walk.

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